Data9II®
Mobile Computer Systems

M5 II

Installation and Operation

For systems configured with an 8 inch Display

D9-07-0006
Rev. B

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Revision History

Document number D9-07-0006

Revision	Date
–	May 2006
A	June 2006
B	October 2006

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CHAPTER 1

Introduction

In This Chapter

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  - System Modules, page 4
  - Installed Applications, page 5
- Installation Overview, page 7
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This chapter describes the intended use of this manual.

This chapter also provides a description of the basic M5 II Mobile Computer System and provides an overview for installation planning.

Cautions and warning that must be observed during the installation process are listed.

The typography and navigation conventions used in this manual are explained.

Scope and Purpose

This manual describes the vehicle installation of the M5 II Mobile Computer System configured with an 8 inch Display. Operation of the system and troubleshooting guidance is also provided.

This installation manual is intended to be used by the technical personnel who will perform the system installation in the vehicles, and who will maintain the system during its use. Data911 assumes the users of this manual posses sufficient education and experience to competently execute the technical instructions contained herein.

If the M5 II will first be set up and configured in a shop rather than on a vehicle, the *Bench Top Setup Guide* (D9-07-0007) provides pertinent information for that situation.

The basic M5 II system consists of the components shown in Figure 1 on page 4 plus the interconnecting cables and wires shown in Figure 6 on page 23. Technical specifications are listed in Appendix B.

Document Organization

This document is organized as follows:

- Chapter 1 defines the purpose of this manual, provides a product description of the M5 II Mobile Computer System, offers planning and preparation notes, and defines the typography conventions used in this manual.
- Chapter 2 provides generic vehicle installation instructions for the M5 II components, including wiring the system, and powering-on the system for the first time.
- Chapter 3 presents the operational controls and indicators of the M5 II, describes the Power Control Module and its control panel, and describes thermal management and other operational functions of the system.
- Chapter 4 provides information on system maintenance, and gives troubleshooting guidance to help resolve problems.
- Appendix A provides instructions for installing and operating optional equipment that may be ordered with the M5 II.
- Appendix B lists technical specifications for the system and includes the limited warranty statement.

System Description

The M5 II Mobile Computer System is the latest model from Data911, a leading provider of Public Safety mobile data hardware and software products since 1984. The M5 II was designed in response to the needs of Data911 customers. It is a ruggedized, high-capacity computer system designed to withstand the harsh environments encountered by utility and emergency vehicles.

The M5 II uses a modular design, which facilitates flexibility and ease of installation. The Display can be mounted in a variety of locations to accommodate special needs of the user. The Processor can be mounted in locations up to meters (ft) from the display.

Features

The major features of the M5 II include:

- Sunlight-visible touchscreen offering a high bright (1200+ Nit) display for ease of use during bright sunny days.
- Faster mobile processor to satisfy the demands of dynamic software applications, such as mapping, field reporting, incident command management, and digital video recording.
- Power Control Module to protect against battery drain and provide an orderly system shutdown automatically when low battery voltage is sensed. Other devices can also be controlled with this module.
- Computer baseboard with custom designed circuitry, I/O connectors, and core modules containing the processor and major chip set.

The M5 II was designed to serve as the host computer to a variety of optional equipment and devices that must be plugged in to a computer. The M5 II Processor provides the following interface connectors:

- Four USB ports
- Two FireWire ports
- Three COM ports
- One VGA port
- One PC card slot (PCMCIA)
- Audio and video inputs

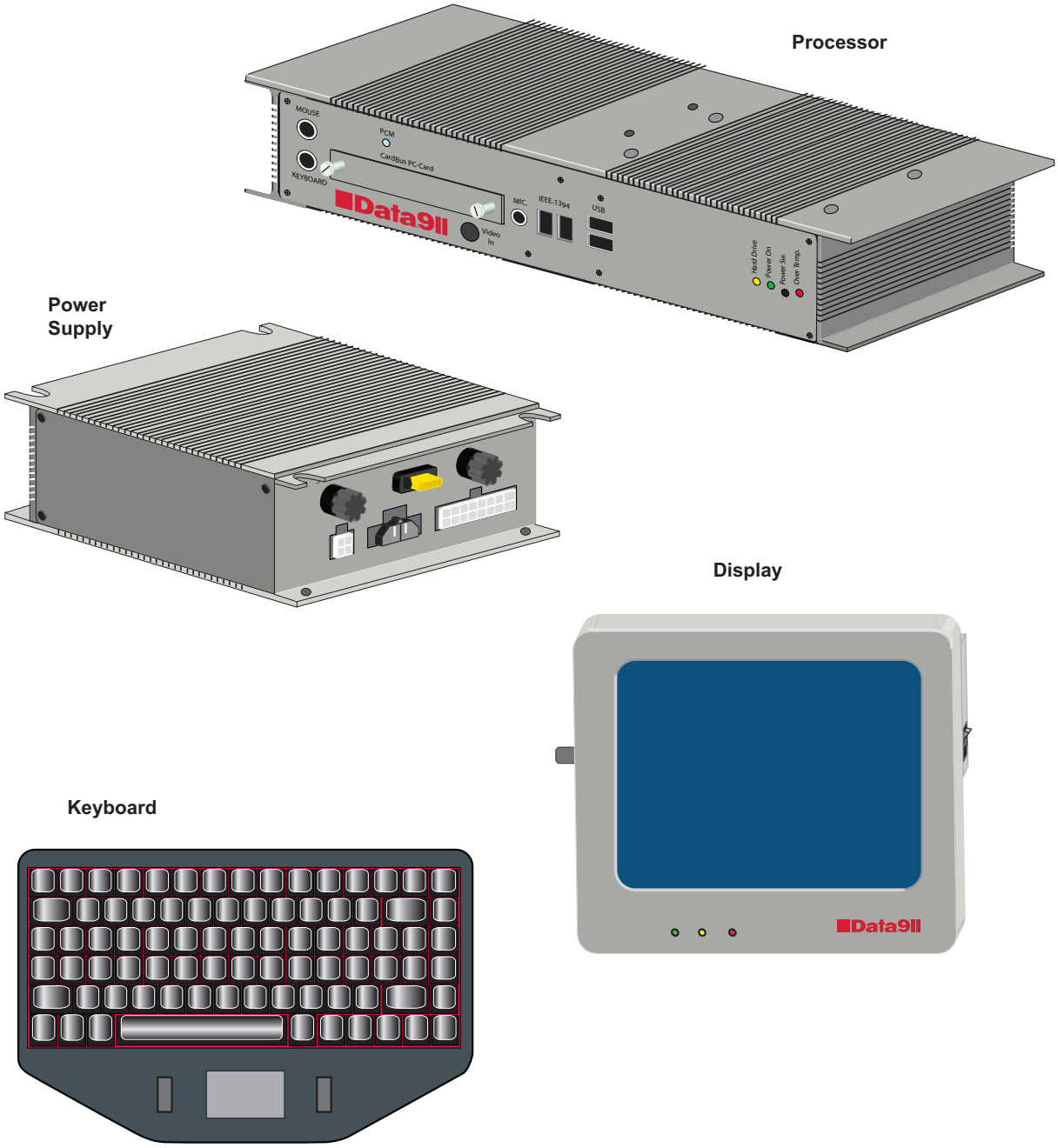
See Appendix A for optional equipment available from Data911.

System Modules

The basic modules of the M5 II are shown below in Figure 1.

The system's LEDs and controls are shown in Figure 7 on page 27.

Figure 1 M5 II System – Basic Components



Installed Applications

There are two applications that come standard on the M5 II. You may need to change their configuration settings for your particular operation.

▶ Power Control Module

The Power Control Module II (PCM II) is a hardware and software module in the M5 II Processor that protects the vehicle and the M5 II Mobile Computer System by initiating actions such as:

- M5 II shutdown or hibernation to prevent vehicle battery drain
- Hard drive heater control to prevent freezing in cold weather
- Power reduction or shutdown to prevent M5 II over-heating
- Generated alerts to inform the operator of problems

The PCM II monitors various operational and environmental conditions and generates critical alerts when the condition exceeds a defined threshold. The alerts warn the operator of the problem prior to initiating M5 II shutdown or hibernation. You can configure the PCM II for your particular application by setting thresholds, defining shutdown or hibernation in response to alerts, and enable/disable the monitoring functions.

Features of the PCM II include:

- Low Voltage Vehicle Battery Detection Option to shutdown or hibernate the operating system when vehicle battery voltage falls below a user-defined threshold voltage. Threshold voltage may be adjusted to any value between 10.00V – 12.00V in quarter-volt increments.
- Ignition State Monitoring Option to shutdown or hibernate the operating system on a delay timer after the ignition key is turned off. The timer may be set from 1 minute to 12 hours in one minute increments, with snooze option available.
- Thermal Monitoring Continuous cold temperature monitoring controls hard drive heater operation to ensure safe hard drive start-up below +5°C (41°F). Optional prior warning of over-temperature conditions and pending shutdown or hibernate.
- Shutdown and Hibernate Options Shutdown is always software initiated and never a hard power off. Hibernation ensures that current data is saved.
- Configurable Alert Notifications Intelligent pop-up windows notify users of monitored events, with optional sound alerts.
- User-Friendly Software Application Highly configurable and responsive application with time-stamped event log allowing detailed tracking of monitored events.
- Vehicle Battery Performance Graphing Real-time vehicle battery profiles help evaluate battery performance during key events, for example vehicle start-up.

Other features are explained in the online *Power Control Module II User Manual* supplied with the system. The manual is accessed from the **Help** button on the PCM II *control panel*.

The PCM II application loads automatically with Windows start-up, and its *monitor window* displays on the desktop. The monitor window provides status on the vehicle battery voltage, ignition status, and PCM II connectivity.

See the section, Power Control Module, on page 28 for operational instructions.

▶ Touch Screen

The M5 II Display includes a touch screen from MicroTouch™. The touch screen allows users to enact a mouse click by simply touching the screen at the target button.

The TouchWare™ application provides a dialog box where you can set various configuration parameters and run diagnostic tests. Some of the common maintenance tasks are discussed in the section, Display and Touchscreen, on page 46.

Installation Overview

The M5 II can be installed on a vehicle in a variety of configurations. There are different lengths of cable harnesses to accommodate various locations of the Processor and Power Supply. There are a variety of mounting pedestals for the Display and Keyboard.

Chapter 2 provides general installation requirements, suggestions and cautions for planning your installation. Additionally, Data911 has a hardware support web site where you will find equipment options and documents that may be helpful for the installation task.

Data911 Hardware Support Contact Information

www.data911.com/M5
rma@data911.com
(510) 865-9100 x125
Fax: (510) 865-9006

Contact Data911 to obtain the login code needed to access the support site.

Note: If you find that your installation actually needs different equipment than what was ordered, please contact Data911 for information on equipment exchanges and upgrades.

Begin planning your installation with the following guidelines. See Chapter 2 for more detailed guidelines on each module.

- Processor and Power Supply – The locations of these units must meet the requirements listed in the sections Processor, on page 12 and Power Supply, on page 15. These units come with mounting brackets that contain cooling fans. *You must use only these mounts for the installation.*
- Display and Keyboard – A variety of aftermarket mounts are available from Data911 and can be viewed on the Data911 hardware support web site. Data911 uses the Gamber-Johnson pedestal mount as standard, unless otherwise specified on the sales order. Manufacturer's installation instructions come with each mount.
- Consider the cable routing when determining the M5 II modules' locations. Adequate cooling, protection from environmental elements, and avoidance of RF interference are factors in determining the installation configuration. See the section, Wiring, on page 20.
- Cabling – Cable options are shown in Table 1 on page 22.

Cautions and Warnings

You must observe the following cautions during installation of the M5 II Mobile Computer System to prevent damage to the system or operational problems.

- Do not connect or disconnect cables with power applied to the system.
- Use only cables supplied by Data911 or that meet Data911 specifications.
- Do not operate the Processor and Power Supply without the mounting brackets and fans to ensure adequate cooling.
- Excessive cable lengths that get coiled near electronic equipment can be a source of RF interference. Use appropriate lengths for all cabling. Cables of various lengths are available from Data911. See Table 1 on page 22 or the Data911 Hardware Support Contact Information, on page 7.
- The M5 II uses the Microsoft Windows XP Pro operating system. Accordingly, as with any Windows PC, you may experience compatibility problems after installing some applications. Any such issues must be resolved with that application's vendor.
- Each M5 II has a new installation of the Windows XP Pro operating system, so you must execute the activation routine for each system you install.
- The operating system is configured by Data911 with specific settings. If you reinstall the operating system, please use the appropriate Data911 Technical Bulletin for OS installation. See Data911 Hardware Support Contact Information, on page 7, for online access to customer support resources.
- All software drivers for devices and applications installed by Data911 are on the drive D logical partition. If you format the hard drive or reinstall the operating system, be sure to copy these drivers and reinstall them.

Always observe the following warnings when performing any installation, maintenance, or repair on a vehicle.

- Ensure proper ventilation when running the engine.
- Set the parking brake.
- Ensure the ignition switch is OFF. Disconnect the negative terminal of the battery when working on or near electrical connections that are always energized.
- Place jack stands under the vehicle if you will be working under the vehicle.
- Remove rings, watches and other jewelry before working on a vehicle.
- Be careful to keep loose clothing away from moving parts.
- Wear safety glasses.

Document Conventions

This section describes the typography conventions, notations and navigation designs used in this manual.

▶ Typography

This manual uses the following stylized typography conventions:

San Serif, regular	Names and labels of on-screen dialog boxes, tabs, windows, etc.
San Serif, bold	Labels of menu commands, buttons, and other action-oriented commands.
Serif, italic	Emphasis of important terms, first use of new terms, book titles.

▶ Notations

This manual uses the following notice conventions:

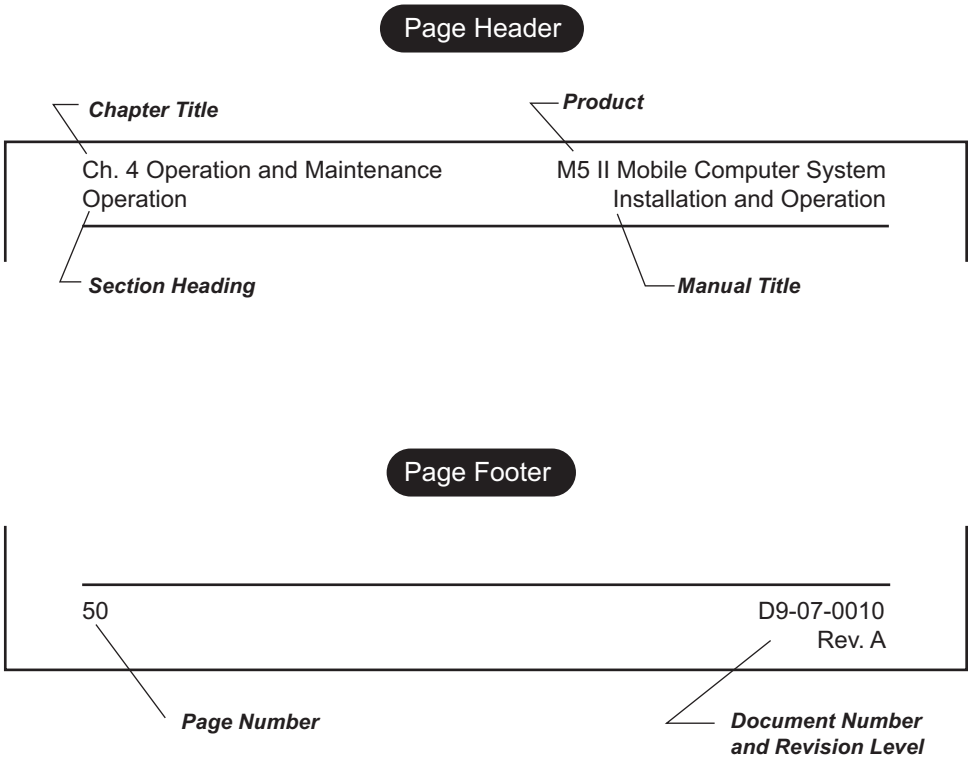
Note: Item of special importance or procedural advise.

Caution: Alert to potential malfunction of, or damage to, the equipment.

Warning: Alert to potential injury to users.

▶ Page Identifiers

This manual uses the following page header and footer conventions:



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CHAPTER 2

General Vehicle Installation

In This Chapter

- Processor, page 12
- Power Supply, page 15
- Display and Keyboard, page 18
- Wiring, page 20
- First Power On, page 24

This chapter provides installation guidance for the individual units that comprise the M5 II Mobile Computer System.

This chapter describes vehicle installations in general and is applicable to all vehicle installations.

Caution: Review the installation *cautions and warnings* on page 8 before proceeding with this chapter.

Processor

This section describes installing the M5 II Processor.

Read the installation notes following Figure 2 when choosing a location for the Processor.

Explanation of the LEDs and power switch is provided in Figure 7 on page 27.

Installing Processor onto Mount

The M5 II system includes a Processor mounting bracket that must be used for vehicle installations because it houses the cooling fan. Figure 2 below shows how to assemble the unit onto the mount.

All fasteners are included with the system.

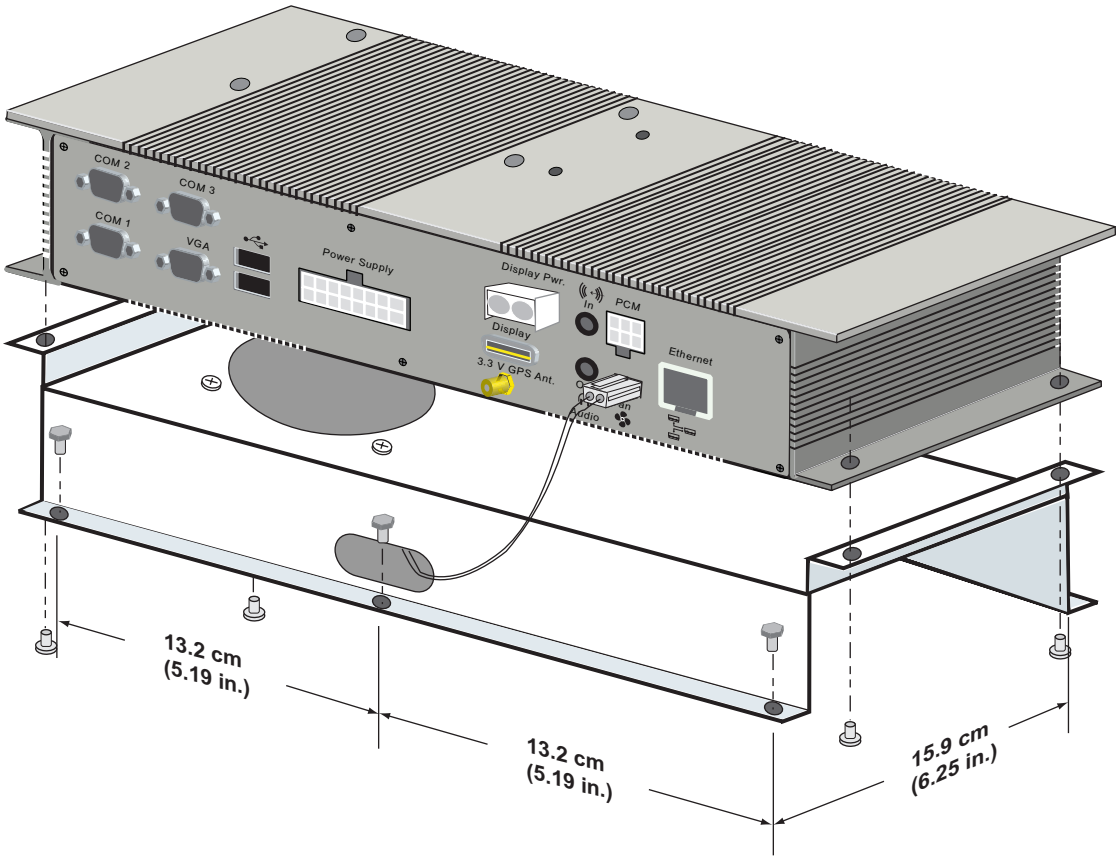
Step 1 Fasten the Processor to the mount using four 10-32 x $^{3}/_{8}$–inch screws. Be sure that the fan is located beneath the large cooling fins on the bottom of the Processor.

Step 2 Route the fan cable through the access hole in the mount and connect it to the FAN connector on the Processor.

Step 3 Install the assembly at the chosen location in the vehicle using six $^{5}/_{16}$ –inch self-tapping sheet metal screws.

Electrical connections are discussed in the section, Wiring, on page 20.

Figure 2 Processor Installation



Installation Notes

- Environmental Conditions

  Locate the Processor where it will not get wet from either rain or water splash from the road.

  Water drip from condensation can be a problem in humid climates. If you operate in such a climate, Data911 recommends you inspect the M5 II installation under humid conditions and rectify any potential water drip problems.

  The Processor must be installed in a location where the fan can circulate air from the bottom of the assembly to the underside of the Processor chassis. Ensure there is at least three inches of clearance around the assembly.

If the Processor is installed in a small compartment or equipment box, ensure that there are adequate vents for air circulation.

Choose a location where the unit will not be susceptible to physical damage from moving parts on the vehicle, or from tools and equipment being stored on the vehicle.

- Cable Routing

  Consider the cable routing when selecting a location. For reference, an interconnection diagram is in Figure 6 on page 23.

- RF Interference

  The units and cabling of the M5 II are susceptible to RF interference from radios and electrical devices in the vehicle. Broadcasting RF equipment is especially problematic.

  Maintain at least six inches of clearance between any radio and the Processor. The greater the distance between the radio and the Processor, the less likely you will experience interference.

- Front Panel Access

  When choosing a location, consider access to the Processor front panel for maintenance operations.

- Common Ground

  The Processor chassis must have a common ground with the vehicle's chassis ground. Install a ground strap if you are not sure that the Processor assembly has established an adequate ground through its mount and fasteners. Attach the strap to the Processor with one of the screws that secures the Processor to its mount.

  If you install a ground strap, remove any paint or contamination from the vehicle's chassis at the connection point. Preferably, use a nut and bolt rather than a sheet metal screw.

- Fan Operation

  The fan is controlled by a thermal sensor. It activates when the Processor reaches a predetermined internal temperature. So it will not operate immediately when the system is powered-on.

Power Supply

This section describes the installation of the M5 II Power Supply.

Read the installation notes following Figure 3 when choosing a location for the Power Supply.

Installing Power Supply onto Mount

The M5 II system includes a Power Supply mounting bracket that must be used for vehicle installations because it houses the cooling fan. Figure 3 below shows how to assemble the unit onto the mount.

All fasteners are included with the system.

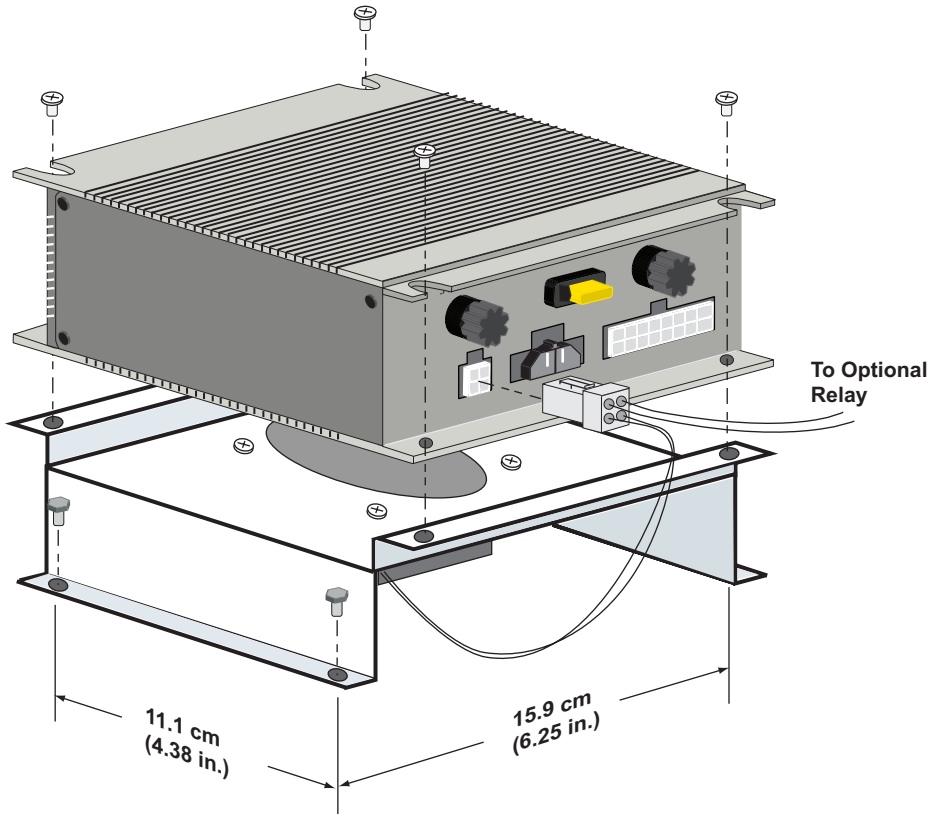
Step 1 Install the mount at the chosen location in the vehicle using four $^{5}/_{16}$ –inch self-tapping sheet metal screws. Orient the mount so that the fan power cable comes out of the mount beneath the Power Supply connector panel.

Step 2 Fasten the Power Supply to the mount using four 10-32 x $^{3}/_{8}$–inch screws.

Step 3 Connect the fan cable to the Power Supply connector. Connect the yellow / black pair in the connector to any optional relay being used. This is discussed further in the section, Wiring, on page 20.

Electrical connections are discussed in the section, Wiring, on page 20.

Figure 3 Power Supply Installation



Installation Notes

- Environmental Conditions

  Locate the Power Supply where it will not get wet from either rain or water splash from the road.

  Water drip from condensation can be a problem in humid climates. If you operate in such a climate, Data911 recommends you inspect the M5 II installation under humid conditions and rectify any potential water drip problems.

  The Power Supply must be installed in a location where the fan can circulate air from the bottom of the assembly to the underside of the Power Supply chassis. Ensure there is at least three inches of clearance around the assembly.

  If the Power Supply is installed in a small compartment or equipment box, ensure that there are adequate vents for air circulation.

  Choose a location where the unit will not be susceptible to physical damage from moving parts on the vehicle, or from tools and equipment being stored on the vehicle.

- Cable Routing

  Consider the cable length and routing when selecting a location. For reference, an interconnection diagram is in Figure 6 on page 23.

- Power Source

  The yellow (+) 10 AWG wire from the Power Supply must connect to the battery. Do not use a common remote terminal where other devices are connected, as this can generate electrical noise into the M5 II.

  The black (–) wire connects to ground. Preferably, it should be terminated at the negative terminal of the battery. If a chassis ground is used, remove any paint or contamination from the chassis at the connection point. Preferably, use a nut and bolt rather than a sheet metal screw.

Note: You must provide and install a 20 amp fuse or circuit breaker into the positive (yellow) wire of the input power harness. Locate the fuse or circuit breaker as close to the battery as possible.

- RF Interference

  The units and cabling of the M5 II are susceptible to RF interference from radios and electrical devices in the vehicle. Broadcasting RF equipment is especially problematic.

  Maintain at least six inches of clearance between any radio and the Power Supply. The greater the distance between the radio and the Power Supply, the less likely you will experience interference.

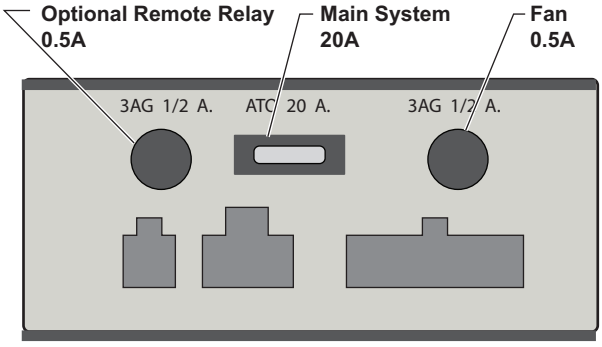
- Fan Operation

  The fan is controlled by a thermal sensor. It activates when the Processor reaches a predetermined internal temperature. So it will not operate immediately when the system is powered-on.

- Fuses

  The system fuses are located in the Power Supply as shown in the following figure.

Figure 4 System Fuses



Display and Keyboard

This manual describes the M5 II with a 8 inch Display and the TG3TP (touch pad) Keyboard. Your keyboard may be a different model but that does not effect the installation procedures.

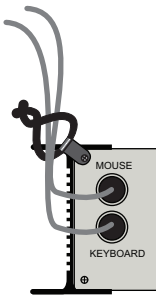
Data911 uses the Gamber-Johnson pedestal mount as standard for the Display and Keyboard, unless otherwise specified on the sales order. Other aftermarket mounts can be viewed on the Data911 web site (see page 7). Manufacturer's installation instructions come with each mount.

See Figure 7 on page 27 for explanations of the Display LEDs and controls.

Installation Notes

- The Display has a wide viewing angle so it is not necessary to position it directly in front of the user. However, keep the Display within reach of the user since it is equipped with a touch screen interface. The Keyboard, of course, also has to be within the user's reach.
- The Display must attach to the mount using at least two of the three screws holes (8-32) on each side of the unit (see Figure 5). Use the holes to center the Display vertically in the mount.

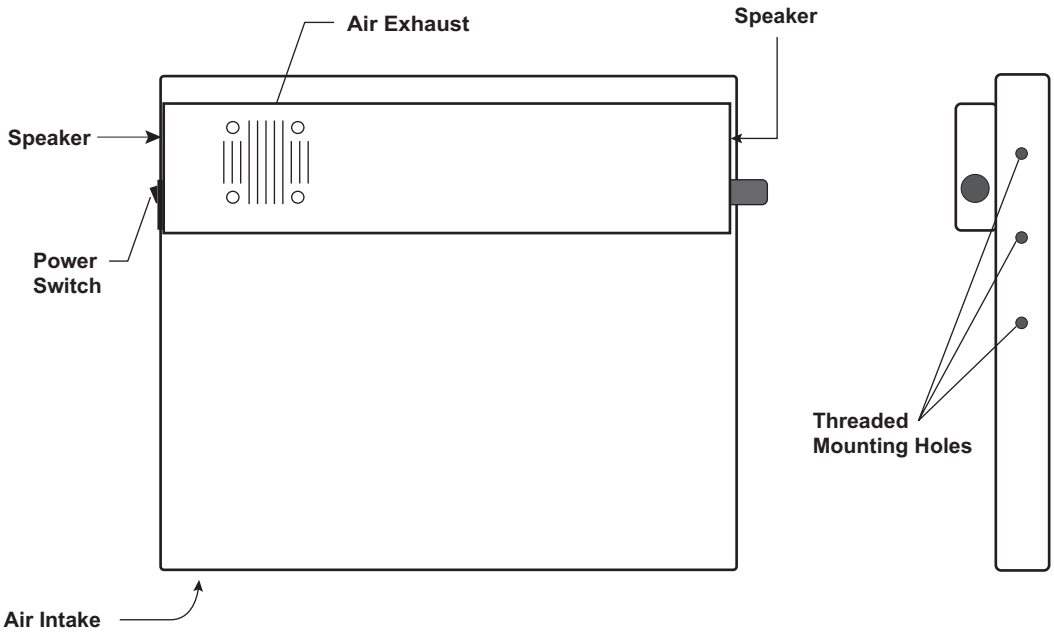
  The mount must not block the air intake near the bottom, or the exhaust vent near the top, on the back of the Display (see Figure 5 below).
- Use the cable strain relief that is located on the top left screw of the Processor to secure the Keyboard cables. The relief locks by twisting the ends together.



- If your keyboard has a USB connector, connect it to any of the USB ports on the Processor rather than the PS/2 ports shown in the diagrams.

  A strain relief for the USB connectors can be ordered from Data911. See USB Strain Relief, on page 63, in Appendix A.
- Consider the cable routing when selecting a location. For reference, an interconnection diagram is in Figure 6 on page 23.

Figure 5 Display Back Panel



Wiring

After the M5 II modules have been installed on the vehicle, connect the wires and cables as shown in the interconnection diagram in Figure 6 on page 23.

Caution: Do not connect vehicle power to the Power Supply until you have installed and connected all of the system's wires and cables.

Installation Notes

- Input Power Harness

  In the input power harness, the yellow (+) 10 AWG wire from the Power Supply must connect to the battery. Do not use a common remote terminal where other devices are connected, as this can generate electrical noise into the M5 II.

Note: You must provide and install a 20 amp fuse or circuit breaker into the positive (yellow) wire of the input power harness. Locate the fuse or circuit breaker as close to the battery as possible.

  Connect the black (–) wire to ground. If a chassis ground is used, remove any paint or contamination from the chassis at the connection point. Preferably, use a nut and bolt rather than a sheet metal screw.

- Optional Relay

  The four-conductor plug from the Power Supply fan includes a yellow (+) and black (–) wire pair. This pair can be connected to a relay that controls other devices (modem, for example) by powering it on and off coincident with M5 II power. The yellow power wire is fused at 0.5 amps. If you do not use this power signal, insulate and secure the wires to prevent shorting.

  The yellow wire carries battery voltage when the M5 II is powered on; the black wire is conductive to chassis ground with power on or off.

- Power Control Module

  Power Control Module II wire harness consists of these wires:

  Red – Battery power

  Black – Ground

  Yellow – Ignition sensing

  Connect the red (+) wire to the battery, the black (–) wire to ground, and the yellow wire to a switched ignition terminal. Data911 recommends installing in-line fuses into both the red and yellow wires. A maximum 1 amp fuse is required.

- Non-directional Cables

  The main power extension and video signal cable are not directional, so either end can be connected to their respective modules. However, note that a noise suppression ferrite is installed on the main power extension. The ferrite must be positioned as close as possible to the Power Supply, as shown in Figure 6 on page 23.

- Cable Routing

  The cables must be kept clear of moving parts or sharp edges that could damage them. Also, be cautious of areas where tools and equipment may be stored. A Cable Protector Kit is available from Data911 and can be viewed on the support web site (see page 7).

  Avoid routing cables near heat sources such as the exhaust system. If routing across the floor board, ensure there are no hot spots caused by a muffler or catalytic converter.

  Excessive cable lengths that get coiled near electronic equipment can be a source of RF interference. Use appropriate lengths for all cabling. Cables of various lengths are available from Data911, as shown in Table 1 below.

Caution: You must maintain a minimum 13 mm (0.5 in.) bend radius in the LVDS cable during installation, and avoid crimping or pinching the cable.

  The LVDS cable for the Display is more susceptible to damage from sharp bends, crimping and pinching than other cables. The advantage of LVDS is the low voltage, which allows for smaller gauge wires in the cable. This reduces the cable size, but also makes it more vulnerable to physical damage.

- Strain Relief

  All of the wiring must have strain relief anchors near the connectors to prevent damaging the connectors. Strain reliefs are not supplied with the system.

System Cables

Table 1 below shows the part numbers for the system cables that ship with the M5 II. These cables are available in different lengths if you need to exchange your existing cables.

Table 2 shows cable extensions available from Data911 if your installation requires extra length cables.

Caution: You must use Data911 cables, or cables approved by Data911, to ensure proper operation of the M5 II.

Table 1 M5 II System Cables

Designator*	Description	Part Numbers (and optional lengths)
A	Input Power Harness	CA-05-2009
B	Main Power Extension	CA-05-2011-75 (0.75m) (2.5 ft) CA-05-2011-02 (2m) (6.6 ft) CA-05-2011-55 (5.5m) (18 ft)
C	Power Control Module Cable	CA-05-2037
D	Audio Cable	CA-05-2014-02 (2m) (6.6 ft) CA-05-2014-07 (7m) (23 ft)
E	LVDS Video Signal	CA-05-2013-02 (2m) (6.6 ft) CA-05-2013-06 (6m) (19.7 ft)
F	Display Power	CA-05-2012-02 (2m) (6.6 ft) CA-05-2012-06 (6m) (19.7 ft)

* The letter designators refer to the interconnection diagram in Figure 6 below.

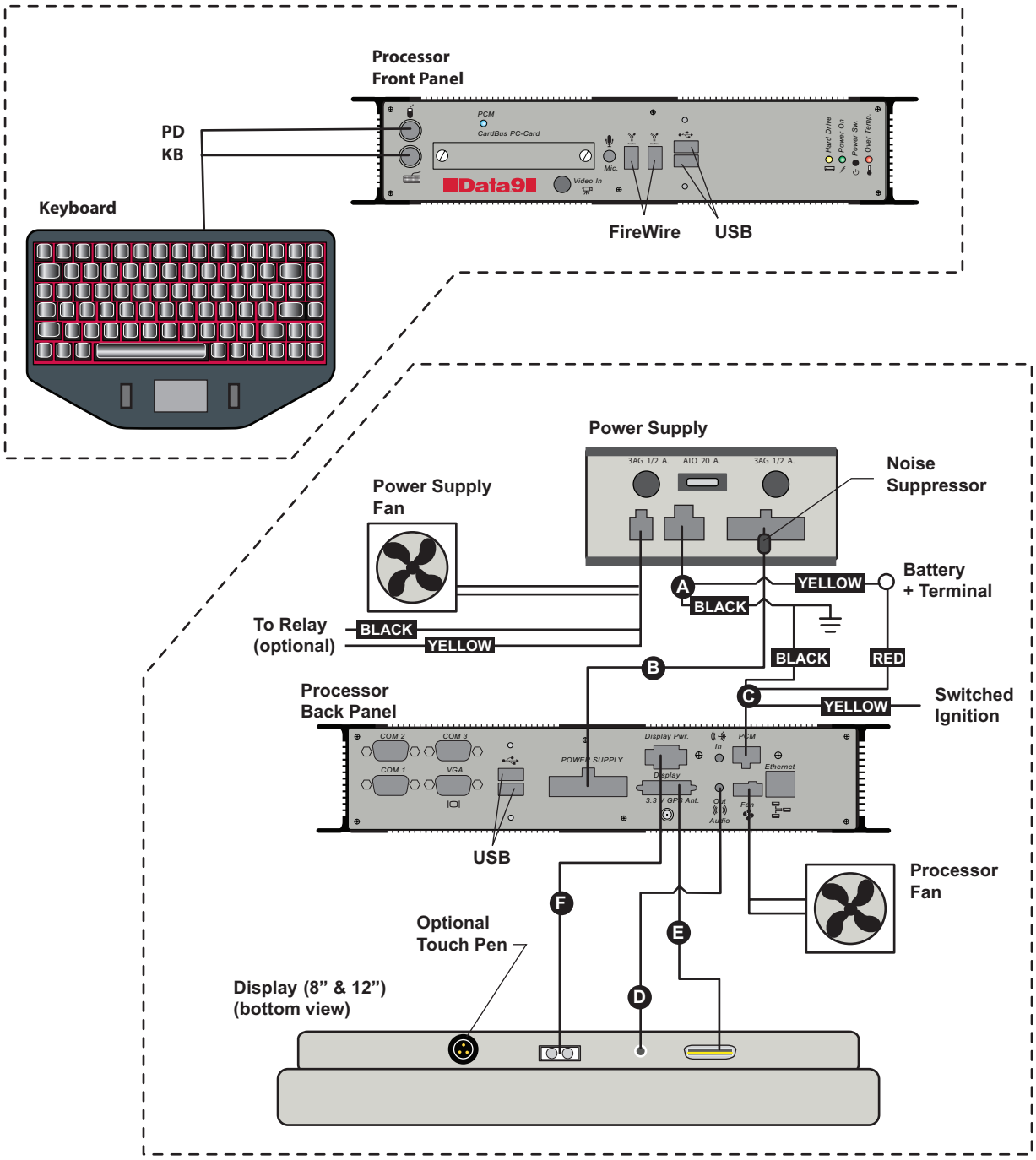
Table 2 M5 II Cable Extension Options

Description	Part Numbers
Extension for DB-9 serial cables	CA-05-1035-06 (1.8m) (6 ft) CA-05-1035-10 (3.1m) (10 ft) CA-05-1035-20 (6.1m) (20 ft)
Extension for PS/2 Keyboard and Mouse	CA-05-1053-06 (1.8m) (6 ft) CA-05-1053-12 (3.7m) (12 ft) CA-05-1053-20 (6.1m) (20 ft)
Extension for USB cables	CA-05-1054-10 (3.1m) (10 ft) CA-05-1054-16 (4.9m) (16 ft)

Interconnection

The letter designators in the following diagram refer to the cables in Table 1, above.

Figure 6 M5 II Interconnection Diagram



First Power On

The main power switch for the M5 II is located on the Display (see Figure 7 on page 27). It is a momentary rocker switch. Push and release the switch to turn on the system. There is a power switch on the Processor that may also be used.

The M5 II requires some initial set up when it is powered on for the first time. The system has a new installation of the Windows XP Pro operating system that requires activation; the Power Control Module II opens its monitor window and may display alarms; and the touch screen may require calibration.

Windows XP Pro Operating System

The M5 II is shipped with the Windows XP Pro CD and manual. The *Product Key* needed for registration is on the sticker affixed to the front panel of the Processor.

When you boot up the computer for the first time the Windows XP Pro splash screen displays for a few minutes as the operating system initializes itself. Then the Setup Wizard opens.

Work through the Setup Wizard using your preferences and departmental guidelines. Enter the product key from the sticker on the Processor.

After this initial setup you will also see various warnings to configure other components of the operating system.

Power Control Module

The Power Control Module II (PCM II) loads automatically when the Processor boots. The PCM II monitor window opens and displays on the desktop. The monitor window provides status on the vehicle battery voltage, ignition status, and PCM II connectivity. Any active alarms will also display. You may have alarms if the engine is not running or the sense wire is not connected.

More information on working with the PCM II is in the section, Power Control Module, on page 28.

Touch Screen

On the first power-up you may find that the cursor does not locate properly when the screen is touched. If so, you must calibrate the touch screen.

Information on calibrating the touch screen is in the section, Display and Touchscreen, on page 46.

Data911

CHAPTER 3

Operation and Controls

In This Chapter:

- LEDs and Controls, page 26
- Power Control Module, page 28
  - Monitor Window, page 28
  - Alerts and Alarms, page 29
  - Control Panel, page 30
- Thermal Management, page 40
- Other Operational Settings, page 42

This chapter describes how to operate the various controls of the M5 II, explains the LEDs, and provides a technical reference for operational features of the Mobile Computer System.

LEDs and Controls

The Processor and Display contain most of the LEDs and controls for the M5 II system. These items are explained in Figure 7 below.

The controls consist of two power switches, and brightness controls for the Display and Keyboard:

- The most commonly used system power switch is the rocker switch on the Display; the Processor has a push button power switch that may also be used.
- The Display brightness control is a rotating knob on the left side of the unit.
- The standard Data911 keyboards are backlit with seven brightness levels plus an “off” setting. There are two methods of adjustment:
  - Press the <FN + ↑> keys to raise the backlight level, and press <FN + ↓> to lower the level.
  - Press the <FN> key plus a number <1-7> key to set the backlight level. Press <FN + 0> to turn off the backlight.

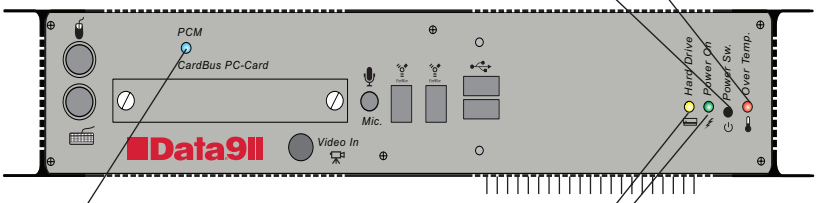
Figure 7 LEDs and Controls

Power Sw. − Button

Press to power-on. While on, press to initiate shutdown routine. (This function is set in the operating system.) In emergency, press and hold to power-off.

Over Temp − Red

Steady when CPU has shut down due to high temperature.



Power On − Green

Steady when power is applied to the system.

Hard Drive − Yellow

Flashes randomly when hard drive is operating.

PCM − Blue

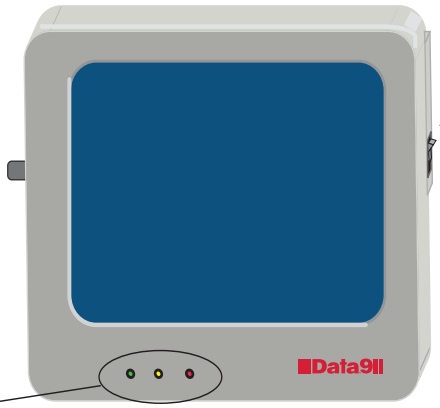
Flashes in different sequences to indicate low temperature warning. The hard drive heater activates at the first stage of the warning sequence.

- Periodic single flash indicates a temperature between +5°C and -5°C.
- Periodic double flash indicates a temperature between -5°C and -15°C.
- Periodic triple flash indicates a temperature between -15°C and -25°C.
- Periodic quadruple flash indicates an internal ambient air temperature lower than -25°C.

Power Switch

Momentary rocker switch. Press to power-on. While on, press to initiate shutdown routine. In emergency, press and hold to power-off.

Brightness Control



LEDs

Solid Green − Power on.

Yellow − Illumination reduction due to over-temperature condition.

Red − Illumination off due to over-temperature condition.

Power Control Module

This section presents the operational aspects of the Power Control Module II (PCM II). A full description of features is on page 5. Wiring the PCM II is explained on page 20.

The PCM II loads automatically when the M5 II Processor boots. It monitors vehicle battery voltage, ignition status, and internal Processor temperature. It generates a critical alarm when a monitored condition is sensed to exceed the threshold set in the PCM II control panel. The alarm causes an alert to be displayed on the M5 II Display. These alarms initiate operating system shutdown or hibernation in response. You can set which of those responses occurs in the PCM II control panel.

The PCM II also controls the hard drive heater that protects against drive freeze in cold weather.

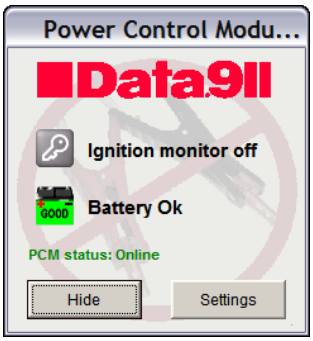
There is a *Power Control Module II User's Manual* online that explains the PCM II functions and features in technical detail. Access the manual from the **View User Manual** button on the General tab of the PCM II Control Panel (described below).

Monitor Window

The PCM II monitor window loads onto the desktop when the M5 II boots.

The monitor window displays the following status messages:

- Ignition – Vehicle ignition on or off. Ignition monitoring off.
- Battery – Battery OK, low, or disconnected. Battery monitoring off.
- PCM Status – Online indicates the PCM II is communicating with the M5 II Processor. No Detection indicates no communication.



Status messages for PCM II with default configuration

In the monitor window, click **Hide** to minimize the window to the system tray. Click **Settings** to open the PCM II Control Panel. Note that upon opening the control panel the monitor window closes and all normal monitoring functions terminate.

You can access the PCM II monitor window at any time by clicking the icon in the system tray. If the application has been stopped, you can restart it with the Desktop icon or from **Start** > **All Programs**. You can stop the application with the **End Program** button in the PCM II Control Panel.

Alerts and Alarms

Alerts are messages that appear on the M5 II Display screen in floating windows. Alerts notify the operator when one of the monitored functions has crossed its critical alarm threshold. Critical alarms start a timer that counts down to an operating system shutdown or hibernation.

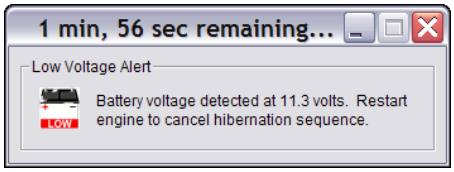
Alerts may be minimized to the taskbar, otherwise they will display in front of all other desktop windows. If you close an alert it will re-appear until the underlying condition is remedied.

You can configure many of the alarm parameters in the PCM II control panel, as described beginning on page 30.

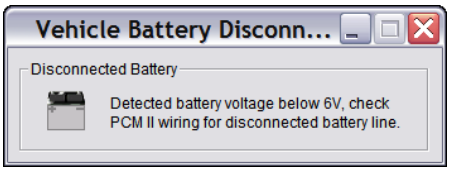
▶ Battery Alerts

Battery monitoring is on by default. Battery voltage is sensed by the red wire in the PCM wire harness.

Low Voltage – This alert displays when the measured battery voltage is below the threshold set in the PCM II control panel. The default setting is 11.5 volts. A timer, fixed at two minutes, counts down to shutdown or hibernation.


1 min, 56 sec remaining...
Low Voltage Alert
Battery voltage detected at 11.3 volts. Restart engine to cancel hibernation sequence.

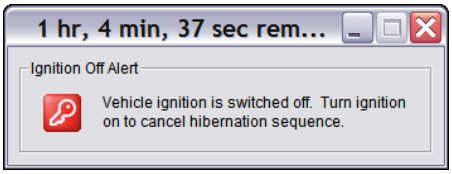
Disconnected – If battery voltage is sensed to be below 6V, the PCM II assumes that the sense wire has been disconnected. It does not initiate a shutdown or hibernation.


Vehicle Battery Disconn...
Disconnected Battery
Detected battery voltage below 6V, check PCM II wiring for disconnected battery line.

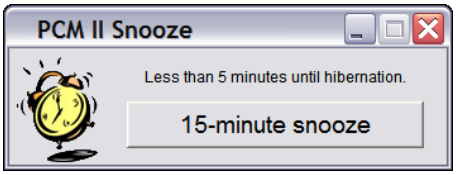
▶ Ignition Alerts

Ignition monitoring is off by default. Ignition status is sensed by the yellow wire in the PCM wire harness.

Ignition Off – This alert displays if the PCM II is left running after the vehicle ignition has been shut off. The alarm initiates a timer for shutdown or hibernation, which is set at one hour and thirty minutes by default.

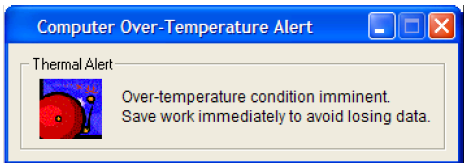

1 hr, 4 min, 37 sec rem...
Ignition Off Alert
Vehicle ignition is switched off. Turn ignition on to cancel hibernation sequence.

Snooze – Five minutes before the timer expires a *snooze button* displays in a window. The operator can click this button to postpone the shutdown or hibernation by 15 minutes.

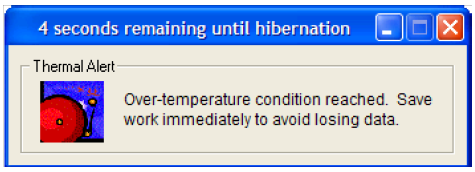


▶ Over-Temperature Alerts

High temperature monitoring is on by default. This function monitors the internal temperature of the M5 II Processor. The temperature alarm thresholds are set in the software and cannot be changed.



Over-Temperature, non-critical – This alert displays when the internal temperature of the Processor is within the range from 68°C to 70°C (154°F to 158°F). This alert does not initiate a shutdown or hibernation. It is intended to notify the operator of an impending over-temperature condition.


4 seconds remaining until hibernation
Thermal Alert
Over-temperature condition reached. Save
work immediately to avoid losing data.

Over-Temperature, critical – This alert replaces the previous, non-critical alert when the internal temperature of the Processor is above 70°C (158°F). It is a critical alarm and initiates a shutdown or hibernation after a fixed-length 20 second timer.

Control Panel

Use the PCM II control panel to customize the PCM II for your operations or to otherwise make configuration changes. Each of the ten tabbed pages in the control panel is explained below.

The M5 II is delivered with the PCM II pre-configured for typical service, with one exception: the ignition monitor is disabled as a function of production testing.

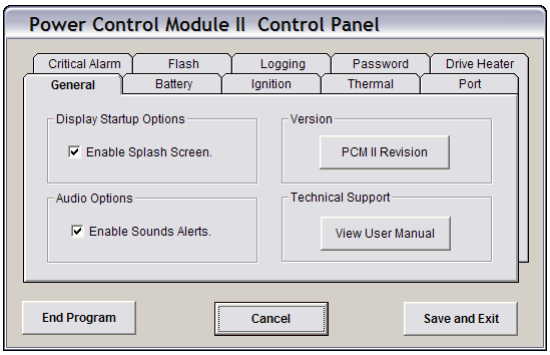
Note: Be sure to enable to the ignition monitor, if desired, before putting the M5 II into service. See Ignition Tab, on page 33, for details.

Click **Settings** in the monitor window to open the PCM II Control Panel. Enter the password when prompted. If a password has not been set, simply click **OK** to access the control panel. Note that upon opening the PCM II Control Panel, the monitor window closes and all normal monitoring functions terminate.

With the control panel open, use the **End Program** button to close the PCM II application, which stops all monitoring except the low temperature monitor. Use **Cancel** to close the control panel without saving changes and resume normal monitoring. Use **Save and Exit** to save changes and close the control panel and resume normal monitoring.

The default settings for all pages in the control panel are shown below in the image for each tabbed page.

▶ General Tab



Display Startup Options

Causes the splash screen to display for three seconds when the PCM II starts.

Audio Options

Causes an audible sound when an alert is displayed.

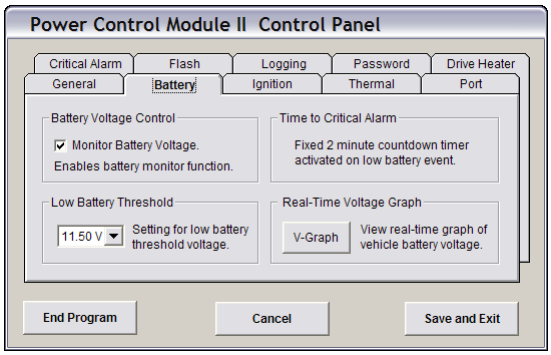
Version

Displays software and firmware revision levels.

Technical Support

Opens the *PCM II User Manual*, which is in PDF format. This document provides a detailed technical reference.

▶ Battery Tab



Battery Voltage Control

Compares vehicle battery voltage to the setting in the Low Battery Threshold panel. Voltage detection is triple-sampled over a 10-second period to guard against momentary spikes or dips.

When the PCM II detects voltage below the threshold, it displays an alert (see page 29) and a two minute timer begins the countdown to hibernation or shutdown. The monitor window also displays a low voltage message. The low battery alert and countdown cancels if the low battery condition is resolved (for example, if the engine is started and the battery recharges).

The battery monitor has priority over the ignition monitor so when it activates a low battery alarm, ignition monitoring ceases.

If the PCM II measures battery voltage below 6V it assumes the battery is disconnected. Under this condition the alert and countdown to critical alarm does not initiate. Instead, the battery disconnect alert displays, which does not initiate hibernation or shutdown.

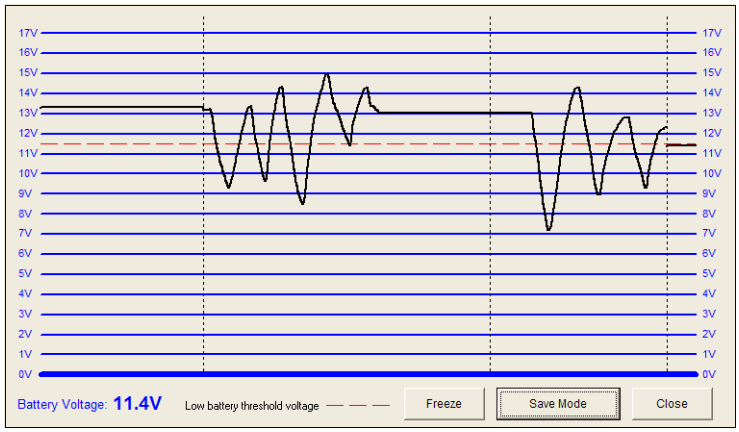
Low Battery Threshold

Use this panel to set a battery voltage threshold below which the low battery alarm is generated. The default alarm threshold is 11.5V.

You can set threshold values within the range of 10V to 12V in quarter volt steps.

Real-Time Voltage Graph

Click the **V-Graph** button to open a real-time voltage graph, as shown here:



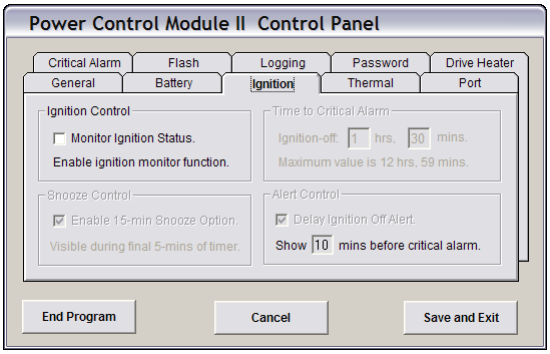
Use this graph function to profile battery performance. The graph plots the measured voltage and shows the alarm threshold setting. The measured voltage is also displayed in text in the lower left corner. The graph will not plot voltage dips or spikes of a duration shorter than 20ms.

During graphing PCM II monitoring is stopped, therefore you should not run the graph for long periods of time.

Continue/Freeze – This button stops the plotting and “freezes” the image, or, if frozen, restarts the plotting.

Save Mode – This button toggles the image save functions on and off. When save mode is enabled, each completed graph is stored as an image file in the directory C:\Program Files\Data911\Power Control Module II\Voltage Graphs. The program creates this directory automatically and sequential numbers the saved image file names.

▶ Ignition Tab



Ignition Control

Ignition monitoring is off by default. When enabled, the PCM II monitors the vehicle's ignition state. It detects when the ignition switch is in the ON or ACC position, it does not detect whether or not the engine is running.

If the M5 II is on and senses the vehicle ignition is off, the PCM II initiates an ignition-off alert (see Ignition Alerts, on page 29) and displays **Ignition Off** in the PCM II monitor window. This starts the timer to hibernation or shutdown with a default time of 1 hours and 30 minutes. The alarm cancels if the ignition returns to ON or ACC.

Note that if a low-voltage battery alarm is initiated during the ignition countdown, the two minute low-voltage battery countdown to hibernation or shutdown takes precedence over the ignition-off timer.

Snooze Control

Opens a window containing a 15 minute snooze button during the last five minutes of the countdown to hibernation or shutdown. This adds 15 minutes to the countdown.

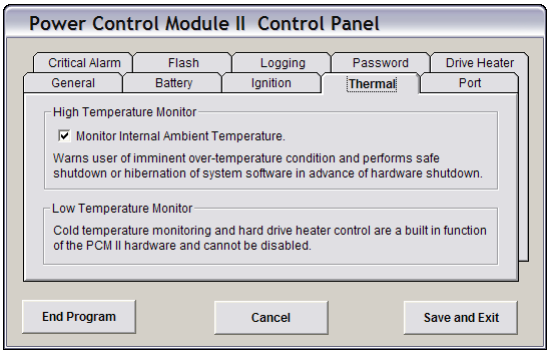
Time to Critical Alarm

Sets the countdown time to hibernation or shutdown. The default is 1 hour and 30 minutes. The range of possible settings is 1 minute to 12 hours in one minute increments.

Alert Control

Delays the display of the ignition-off alert until some user-defined number of minutes before hibernation or shutdown. This option prevents the alert from displaying during the entire countdown duration, which can be several hours.

▶ Thermal Tab


Power Control Module II Control Panel
Critical Alarm
Flash
Logging
Password
Drive Heater
General
Battery
Ignition
Thermal
Port
High Temperature Monitor
Monitor Internal Ambient Temperature.
Warns user of imminent over-temperature condition and performs safe shutdown or hibernation of system software in advance of hardware shutdown.
Low Temperature Monitor
Cold temperature monitoring and hard drive heater control are a built in function of the PCM II hardware and cannot be disabled.
End Program
Cancel
Save and Exit

High Temperature Monitor

Warns the operator of an imminent over-temperature condition in the Processor. See Over-Temperature Alerts, on page 30, for the alert messages.

When the internal temperature of the Processor reaches 68°C (154°F) an alert displays warning the

operator to save all work in anticipation of a forthcoming hibernation or shutdown if the temperature continues to increase. When the temperature reaches 70°C (158°F) another alert displays and a 20 second countdown to hibernation or shutdown initiates. This is a fixed timer and cannot be changed by the user. Both alerts will cancel if the temperature drops below the alarm points.

If the high temperature monitor is not enabled, the operating system invokes an emergency power-off without warning when the temperature reaches approximately 72°C. You should avoid this type of power-off as it constitutes an operating system crash.

Low Temperature Monitor

This monitor function does not initiate alarms or alerts. It monitors the Processor internal temperature and powers the hard drive heater when the temperature falls to approximately 5°C (41°F). The heater protects the hard drive down to –25°C (–13°F).

Hard drive heater activity is indicated by the blue PCM LED on the front panel of the Processor. This LED flashes during hard drive heater operation in the following patterns:

- Periodic single flash: internal temperature between +5°C and -5°C.
- Periodic double flash: internal temperature between -5°C and -15°C.
- Periodic triple flash: internal temperature between -15°C and -25°C.
- Periodic quadruple flash: internal temperature lower than -25°C.

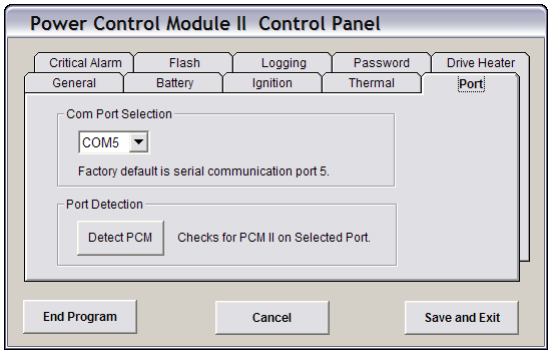
Caution: Cold and freezing temperatures can damage the M5 II Processor hard drive. Be sure to connect the PCM II wire harness as instructed. Do not allow battery voltage to fall below 10 volts during freezing weather.

The low temperature monitor operates even when the M5 II is powered-off and the vehicle ignition is off. This keeps the M5 II ready for instant access.

The hard drive heater draws battery power through the red and black wires in the PCM II wire harness. Therefore, both wires must be properly connected for the heater to operate (see the section, Wiring, on page 20). The heater's power consumption varies from 0.1 to 2.0 watts depending on the Processor internal temperature. There are seven power level steps, each relating to a temperature range within the entire temperature span of where the heater operates. This allows the heater to draws only as much power as is needed for any given temperature range.

The heater control circuit also varies the average current draw depending upon battery voltage. As battery voltage drops, the heater's duty cycle increases to maintain a steady average wattage. However, below 10 volts the battery does not provide enough power to operate the heater at the full capacity needed for the coldest temperatures. If battery voltage continues to decrease, heater performance will also continue to decrease.

▶ Port Tab



The PCM II is configured at the factory to communicate with the M5 II operating system over port COM 5. In certain situations, COM ports may need to be renamed to maintain connectivity. This would be the only time you need to use this tabbed page.

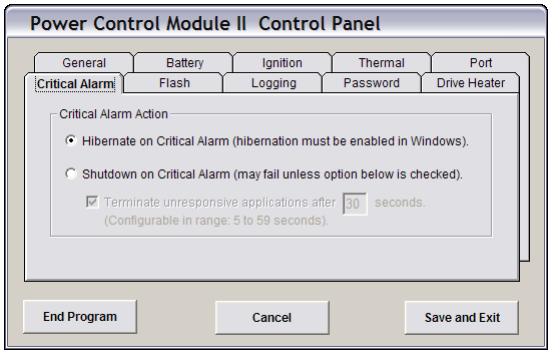
One scenario is if you are connecting a device that is hard-wired to use COM 5. You will need to rename COM ports and reconfigure the PCM II to use a different port:

1. Rename the present COM 5 with a different number. In step 3., you will direct the PCM II to communicate over this port.
   a. Open the Windows device manager by right clicking the My Computer icon and selecting **Manage**. Select **Device Manager** in the window that opens.
   b. In the right pane of the device manager, navigate to Ports and expand the branch.
   c. Right click COM5 and choose **Properties**. Click the Settings tab in the dialog box that opens. Click the **Advanced** button on that page.
   d. In the Advanced Setting dialog, select COM10 or higher from the COM Port Number list, then **OK**. Click **OK** to close the PCI Communications Port dialog. Remember the port number you selected as you will need it in step 3.
2. Rename one of the COM ports associated with a COM connector on the Processor.
   a. Determine which COM port connector on the Processor you will use for the new device (for example, COM 1).
   b. Following the procedure in step 1., open the Advanced Setting dialog for COM 1 and rename it to COM 5. The new device will now communicate over this port.
   c. Close the device manager.
3. Change the COM port setting in the PCM II.
   a. Click the **Settings** button on the PCM II monitor window to open the PCM II control panel, then choose the Ports tab.
   b. In the Com Port Selection list, choose the port number that was set in step 1., which is COM 10 in this example.
   c. Click **Detect PCM** and look for the message **PCM detected** next to the port number list.
   d. Click **Save and Exit** to close the control panel.
   e. In the PCM II monitor window, look for the **PCM status: online** message (see page 28 for example).

Both the PCM II and the new device should now be functional.

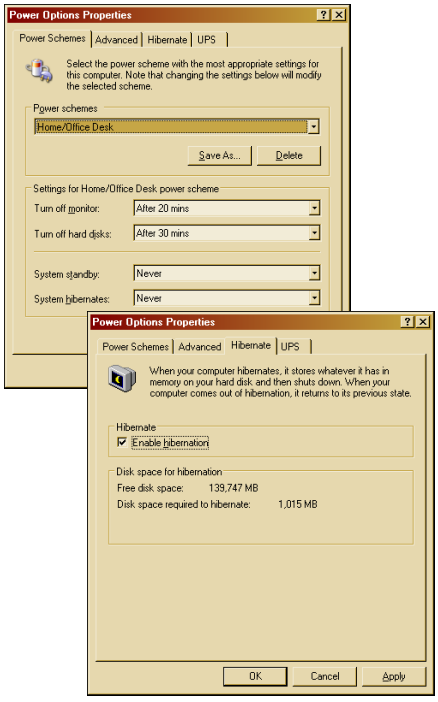
You may also have to use this procedure if the COM ports have generally been reassigned for some reason. If the name “COM 5” is reassigned to another port the PCM II will not function. Under this condition, the message **PCM Status: No Detection (3 retries)** displays in the monitor window. To rectify this, you must select ports one at a time from the Com Port Selection list and test each with the **Detect PCM** button to determine over which port name the PCM II is now communicating.

▶ Critical Alarm Tab



Sets the response to all critical alarms to be hibernate or shutdown of the operating system (OS). Critical alarms are generated by the battery, ignition and thermal monitoring functions of the PCM II.

The PCM II utilizes the shutdown and hibernation features of the Windows XP Pro OS. For the PCM II to invoke hibernation, the OS must have hibernate enabled, but the power scheme to invoke hibernation must be disabled so that the PCM II can manage this function. These settings are the default configuration from the factory. See also the section, Windows XP Power Options, on page 42.



If you need to manually set the OS power management, open the Display Properties window, select the Screen Saver tab, click the **Power** button, select the Hibernate tab and enable the checkbox. Also, on the Power Schemes tabbed page, both System standby and System hibernates must be set to **never**.

If hibernate is not enabled within the OS, a critical alarm timer will cause the M5 II to enter standby mode, which only blanks the video signal to the Display and does not achieve maximum power savings. This occurs even if with standby set to **never**.

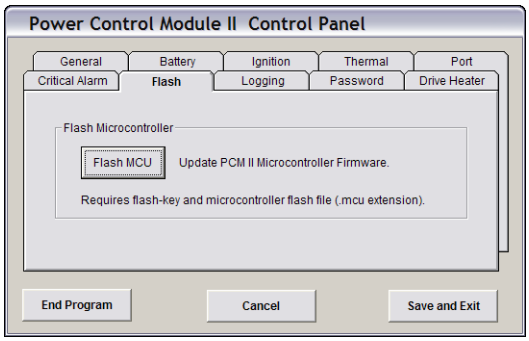
If the System standby timer is set to a time rather than **never**, it may interfere with the PCM II shutdown / hibernation control. If the standby time is less than the timer of any PCM II critical alarm, the OS will go into standby mode and stop the critical alarm timer.

Both hibernate and shutdown of the OS invoke a system shutdown. But hibernate saves the RAM contents to the hard drive so when the OS reboots it returns to its former state. However, some hardware peripherals

and some application may not initialize properly when restoring from hibernation. You should test your system for these potential problems.

Shutdown closes all open applications before closing the OS. However, some application do not respond to the shutdown command and have to be terminated manually or else the shutdown routine will not finish. There is a Terminate unresponsive applications... check box on this tabbed page to force the closure of any such applications. Data911 recommends consulting with the vendor of any unresponsive application before using this forced shutdown option.

▶ Flash Tab



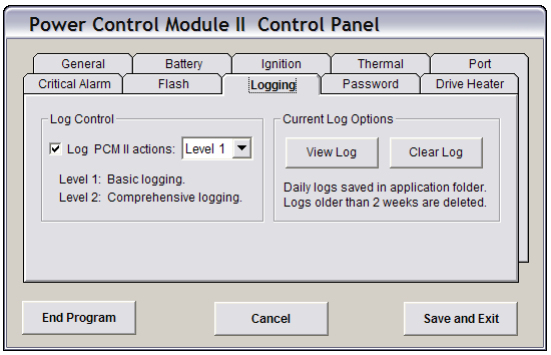
Use this tabbed page if a PCM II firmware code upgrade is released. An upgrade release consists of a firmware file (*.mcu) and a flash key number.

To install the upgrade, store the firmware file where it can be accessed by the M5 II. Click the **Flash MCU** button on the page and follow the prompts. The process is simple and self-explanatory.

During installation, a validation test is run on the new file before you are prompted to proceed with the procedure.

A built-in error-checking and self-recovery feature protects against corrupted code being written into the PCM II microprocessor. If the code is corrupted due to a transmission error or power failure during the upgrade procedure, the M5 II automatically reverts back to the old code. The error is logged should this event occur.

▶ Logging Tab



Log Control

Creates a daily log of internal communication events and actions. Each log entry is time stamped. Entries for alarms and errors contain information about the condition and the PCM II's response. Errors and critical operations are always logged regardless of whether or not logging is enabled.

Note that in any communication protocol a certain percentage of errors are acceptable. Error handling is a built-in feature of the PCM II application.

Use Logging level 1 to record daily operation. It captures the following data:

- Application launch and close events
- Control panel settings and open/close events
- Port detection results
- Hard drive heater test results
- Alert launch and cancellation
- Critical alarms

Use logging level 2 during any troubleshooting operations. Also, include this log in any PCM II problems reported to Data911. In addition to the level 1 data, level 2 also records the following:

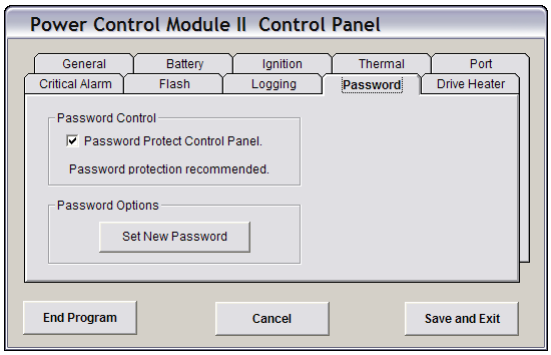
- Bi-directional communications between the application and PCM II module
- User interaction with the application
- Voltage-graph readings
- 30-minute interval temperature, ignition, and voltage readings

Current Log Options

The **View Log** button opens today's log file. The **Clear Log** button deletes today's log. To view earlier logs, navigate to C:\Program Files\Data911\Power Control Module II\.

Logs older than two weeks are automatically deleted.

▶ Password Tab



Password Control

Enables password control for access to the PCM II control panel.

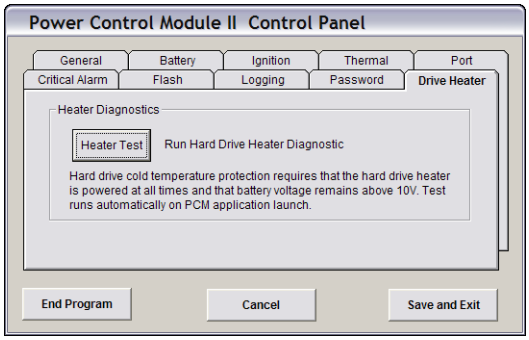
The initial password for a new system is a blank entry. When prompted for a password, just click on the **OK** button. You should change the password after initial entry into the control panel.

Password Options

Sets a new password. The process is self-explanatory.

If the password is lost of forgotten, use the master password – **porsche**.

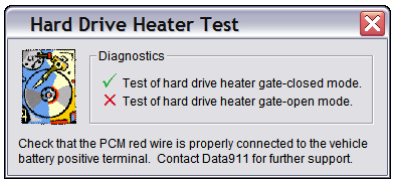
▶ Drive Heater



Tests the functioning of the hard drive heater. See the description under Thermal Tab, on page 33, for details on the drive heater.

This test is designed primarily for the Data911 repair depot. The drive heater is not repairable in the field. However, in the PCM harness plugged into the back panel of the M5 II Processor, if either the red or black wire is disconnected a test failure is reported, which is repairable in the field.

Click the **Heater Test** button to initiate the test function. A windows open to display the test results. Any report of a test failure also includes troubleshooting guidance.


Hard Drive Heater Test
Diagnostics
Test of hard drive heater gate-closed mode.
Test of hard drive heater gate-open mode.
Check that the PCM red wire is properly connected to the vehicle battery positive terminal. Contact Data911 for further support.

The field serviceable failure modes are:

Gate-closed failure – Black wire disconnected

Gate-open failure – Red wire disconnected

If you find no problems with the wire connection, contact Data911 Hardware Support ([510] 865-9100 x125) for further assistance.

Thermal Management

The M5 II is designed with cooling fans and heat protection circuitry to keep the system operating in high temperatures, or to shut down the system if it reaches an over-temperature condition. The Processor also contains a hard drive heater to prevent drive damage in cold weather.

The Power Control Module II application comes installed on the M5 II. It controls the over-temperature shutdown and the low temperature hard drive heaters. See the section, Power Control Module, on page 28 for details.

Processor

The Processor mounting bracket contains a cooling fan that is activated by the internal temperature of the unit, with the activation point set in the BIOS. The Power Control Module II application (page 28) controls the hard drive heaters. The Intel CPU has built-in temperature protection logic.

Table 3 Processor Thermal Management

Feature	Characteristic
Cooling Fan	Activates at +30°C (86°F)
Thermal Shutdown	Processor shuts down Power Supply above +65.5°C (150°F) Red LED illuminates
Hard Drive Heaters	Activates at +5°C (41°F) Blue LED illuminates See Figure 7 on page 27 for details
CPU	CPU throttles back to 50% power above 85°C (185°F) device temperature. Intel® Pentium® M device – SpeedStep® throttles back CPU to 50% power when system is idle.

Power Supply

The Power Supply mounting bracket contains a cooling fan that is activated by the internal temperature of the unit. The Power Supply also has protection circuitry that shuts down the unit above a preset temperature. This will also deactivate any relay connected through the Power Supply's optional relay wires.

Table 4 Power Supply Thermal Management

Feature	Characteristic
Cooling Fan	Activates at +40°C (104°F)
Thermal Shutdown	Power Supply shuts down above +100°C (212°F)

Display

The Display has an internal fan with two speeds that is modulated by the Display's internal temperature. Heat protection circuitry also dims or turns off the display at elevated temperatures.

Table 5 Display Fan Characteristic

Temperature	Fan Speed
Below +24°C (75°F)	Off
+24°C to +60°C (75°F to 140°F)	Low
Above +60°C (140°F)	High

Table 6 Display Brightness Characteristics

Temperature	Brightness
Below +55°C (131°F)	1200+ Nit (through touch screen)
+55°C to +65.5°C (131°F to 150°F)	550 Nit
Above +65.5°C (150°F)	Off

NOTE: Temperatures refers to the internal temperature of the Display as measured by the thermal sensor on the circuit board.

Other Operational Settings

This section describes other system settings in the M5 II that you may want to configure for your particular service.

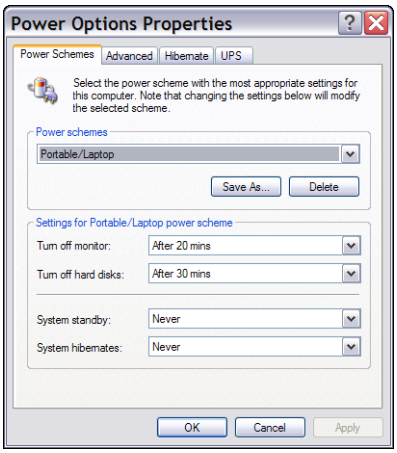
Power Management

This section presents two issues related to power consumption of the M5 II.

▶ Windows XP Power Options

The Power Control Module (see page 28) is a comprehensive power monitoring and protection application that prevents the M5 II from draining the vehicle battery. In addition to that, Data911 configures the Windows XP power options to turn off the Display (monitor) and the hard drive when the system is idle. The Display can account for half of the current draw of the system, depending on brightness level and other factors. Turning off the hard drive will extend its life.

Data911 sets the following Windows XP power options in the M5 II at the factory. This graphic of the Power Options Properties dialog box shows these settings:



- Set Turn off monitor to **After 20 mins**.
- Set Turn off hard disks to **After 30 mins**.
- Set System standby and System hibernate to **never** to be compatible with the PCM II. (See the section, Critical Alarm Tab, on page 36 for more discussion.)

To access the dialog box, right-click on the desktop and select **Properties** from the menu to open the Display Properties dialog. Click the Screen Saver tab, then the **Power** button to open the Power Options Properties dialog.

▶ Battery Charge Guard Devices

A battery charge guard is a popular device that installs into the power cable of accessory equipment to be protected. It monitors battery voltage and disconnects the equipment from the battery when low battery voltage is detected.

Data911 *strongly recommends* not using this type of guard with the M5 II. These guards operate by opening the main power circuit when it detects low voltage. This is the equivalent of unplugging the computer while it is running, which tends to corrupt the operating system and can drastically reduce the life of the hard drive.

The M5 II comes with the PCM II, which performs battery voltage monitoring and invokes an operating system (“soft”) shutdown when low voltage is sensed. See page 28 for details. *A battery charge guard is not necessary with the PCM II operating.*

BIOS Defaults

If the BIOS has been modified and operational problem are subsequently discovered, you can quickly return the BIOS to the factory default settings.

Enter the BIOS by pressing **F2** while the Data911 splash screen displays during bootup. After the BIOS screen opens, press **F9** to restore defaults then **F10** to save and close.

Data911

CHAPTER 4

Maintenance and Troubleshooting

In This Chapter

- System Maintenance, page 46
  - Display and Touchscreen, page 46
  - Keyboard, page 48
  - Fuses, page 48
- Troubleshooting Guidance, page 49
  - Self-Initiated Shut Down or Reboot, page 49
  - Keyboard Problems, page 50
  - USB Device Problems, page 50
  - Troubleshooting a Blank Display, page 50
  - Troubleshooting the Touch Screen, page 54
- Technical Support, page 55
  - Support Resources, page 55
  - RMA Request Procedure, page 56

This chapter contains instructions for maintenance and troubleshooting procedures, and provides technical support information.

System Maintenance

The M5 II does not require any regular maintenance. This section describes the few items that may need maintaining.

Display and Touchscreen

The M5 II incorporates a MicroTouch capacitive touch screen into the Display so that the user does not have to use the touch pad mouse exclusively to move the cursor.

▶ Cleaning the Screen or Touchscreen

To clean the Display's screen or the optional touchscreen, turn off the system. Apply any computer monitor or glass cleaner to a soft cloth and wipe monitor or touchscreen. Do not spray cleaner directly on the Display, as the runoff can seep into the unit. Do not use an abrasive cleaner on the Display.

▶ Maintaining the Touchscreen

A touch screen can change characteristics over time, requiring maintenance to keep the screen functioning properly. The most common symptoms you will see are inaccuracy and cursor jitter.

Inaccuracy is when the cursor is not placed exactly at the touch location. The calibration procedure can correct this problem. If the touch screen seems to be accurate in some locations but not others, the more detailed linearization procedure can be used.

Jitter is when you touch the screen and the cursor appears to vibrate. This can be fixed with the stabilize cursor procedure. Read the notes below before using this procedure.

See also the troubleshooting flow chart on page 54.

These maintenance procedures, and other functions, are executed within the TouchWare Properties window that is opened from the desktop icon or the **Start > All Programs** menu. View the online help document in the Properties window for specific instructions.

In the Properties window:

Calibration is located on the Calibration tab,
Linearization is located on the Tools tab, and
Stabilize Cursor is located on the Cursor tab.

Calibration Recommendation

MicroTouch and Data911 recommend that you calibrate the touch screen in the following circumstances:

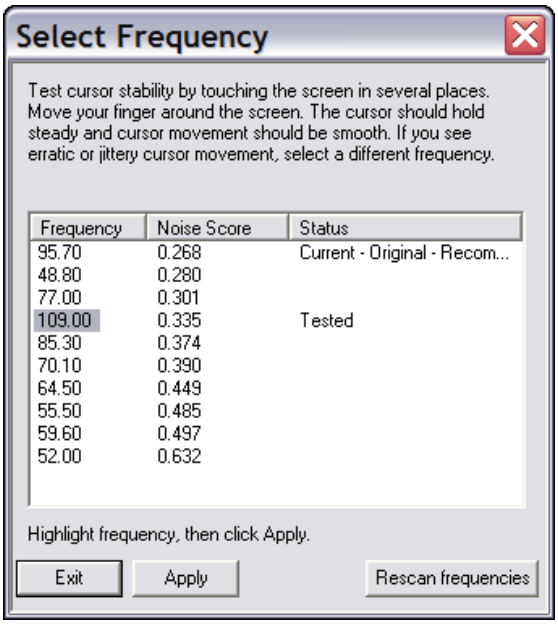
- Any time you change the video resolution (for example 640 x 480) or video mode of the Display.
- Any time you connect the Display to a different computer.
- Any time you run the Stabilize Cursor function from the Cursor tab.
- Any time the cursor does not follow the movement of your finger, or does not reach the edges of the touch screen.

Cursor Stabilization Procedure

MicroTouch has modified their stabilization procedure from that which is described in the TouchWare application.

This automated process tests the cursor at various frequencies and then presents you with a dialog box that lists those frequencies. You then select different frequencies and test the cursor for stable operation.

MicroTouch now recommends that you start with the highest frequency. If the cursor still appears jittery, select the next highest frequency and retest. Continue down the frequency list in descending order until you find a frequency that produces stable cursor movement.


Select Frequency
Test cursor stability by touching the screen in several places. Move your finger around the screen. The cursor should hold steady and cursor movement should be smooth. If you see erratic or jittery cursor movement, select a different frequency.
Frequency
Noise Score
Status
95.70 0.268 Current - Original - Recom...
48.80 0.280
77.00 0.301
109.00 0.335 Tested
85.30 0.374
70.10 0.390
64.50 0.449
55.50 0.485
59.60 0.497
52.00 0.632
Highlight frequency, then click Apply.
Exit
Apply
Rescan frequencies

Keyboard

You can clean the keyboard by gently wiping it with a soft cloth dampened with rubbing (isopropyl) alcohol. This cleaning method is applicable to the touchpad, also.

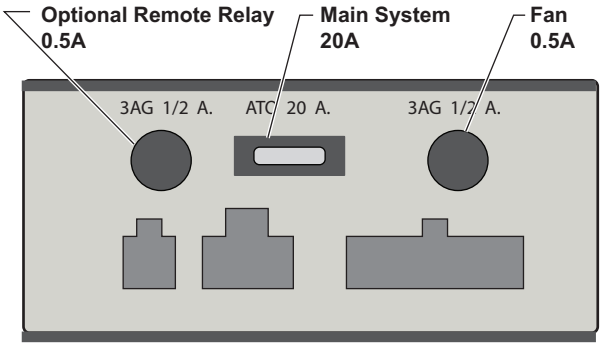
Fuses

The M5 II has the following system fuses installed:

Table 7 System Fuses

Circuit	Rating	Location
Main System	20A	Power Supply
Power Supply Fan	0.5A	Power Supply
Optional Relay	0.5A	Power Supply

System fuses are located in the Power Supply module.



Data911 recommends installing these additional fuses in inline holders:

Table 8 Recommended Fuses

Circuit	Rating	Location
Main System	20A	Input power harness, close to battery
PCM II Power	≤1A	PCM cable, red wire
PCM II Ignition	≤1A	PCM cable, yellow wire

See the System Cables table on page 22 for reference.

Troubleshooting Guidance

This section provides techniques and procedures to help you diagnose symptoms when the M5 II appears to be malfunctioning.

Self-Initiated Shut Down or Reboot

If the M5 II shuts itself down or reboots without being initiated by the user, check or correct the following possible causes. See the section, Wiring, on page 20 for reference.

Power Source

Ensure that the input power harness for the Power Supply module is connected directly to the vehicle battery using a dedicated 10-gauge wire. There must be no other devices connected to this circuit, nor any charge guard / battery timer products used in this circuit. See the section, Battery Charge Guard Devices, on page 43.

External Causes

A shut down or reboot may be coincident with an external factor, such as engine cranking, temperature, road bump, or software function. It is important to know what conditions existed when the failure symptoms occurred. Some examples of external causes of shut down or reboot incidents are:

- Incident when the vehicle hits a bump may indicate a loose connector.
- Incident when the engine is cranking is likely due to excessive voltage drop in the input power harness (drops below 9 VDC). This may be caused by a corroded connector, bad ground, or other such wiring problems.
- Incident when ambient temperature is below freezing or is very hot are usually temporary until the system is brought into operational temperature range. Although, a frozen hard drive can incur permanent damage if it is not warmed before its disc spins.
- Incident when a certain application is running or a certain function is executed may be caused by that application, or indicate an operating system problem.

Main Power Extension Connections

Remedy a possible voltage drop at the Processor by cleaning and re-seating the main power extension harness connectors and their mating connectors in the modules. Use an electrical contact cleaner. This is especially important in moist environments.

The main power extension is a large cable harness. Vehicle motion can cause movement of the harness that pulls on the connector pins creating an intermittent or open circuit. If this is a problem in your vehicle, devise harness anchors close to the connectors to stabilize the harness.

Keyboard Problems

Use these procedures to help identify the cause of a non-responsive keyboard.

Individual Keys Non-Functional

If individual keys or sections of keys on the keyboard are non-functional the likely cause is a damaged circuit board. The keyboard must be replaced or returned for repair.

No Keys Work / Stuck Keys / Keyboard Errors

If the keyboard demonstrates any of these symptoms, check for damage in the keyboard cable connector. If no damage is apparent in the connector, install a known good keyboard to verify that the problem is isolated to the keyboard. If the problem persists with the new keyboard, then the keyboard connector in the Processor is the likely cause of failure.

USB Device Problems

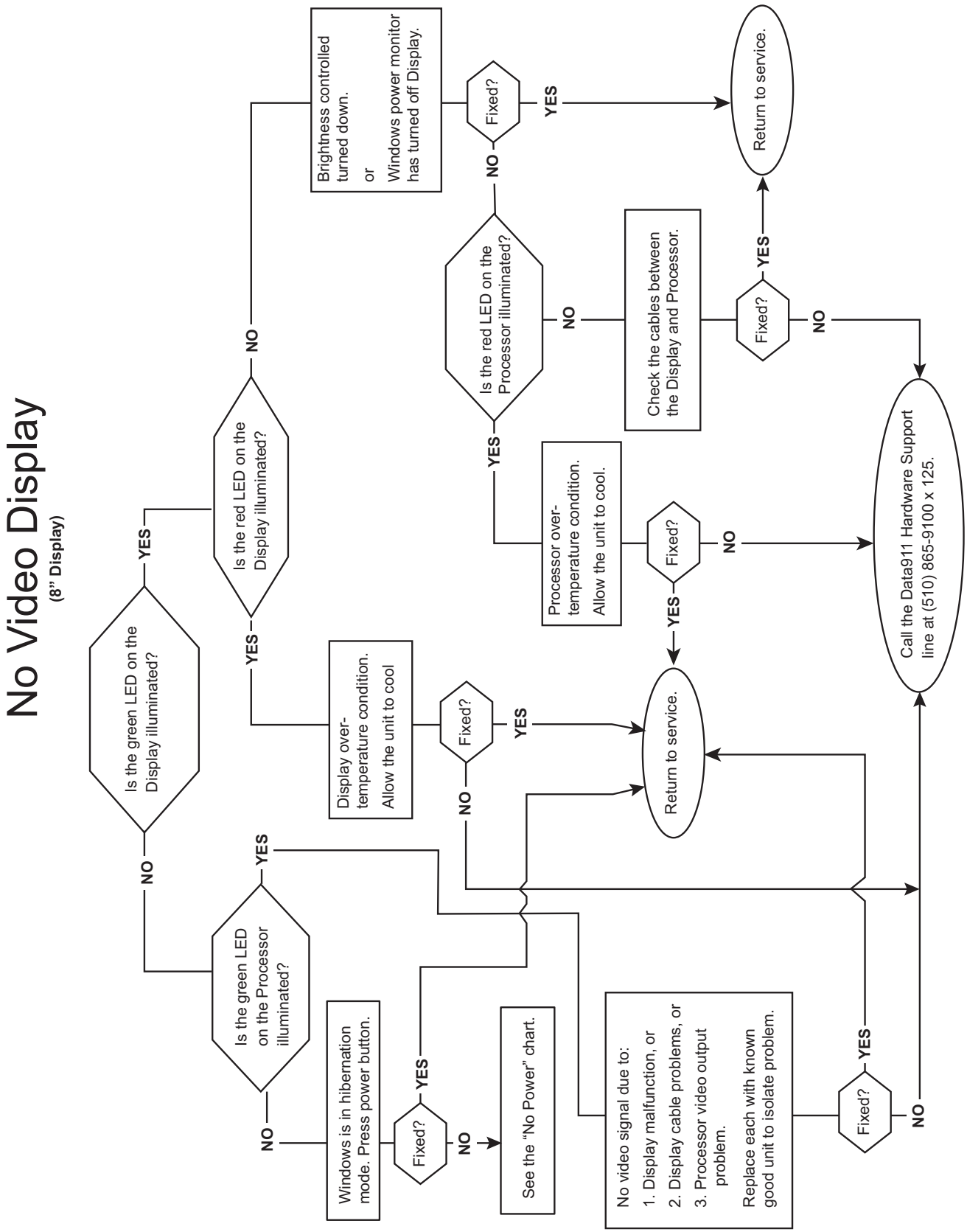
USB ports are limited to a 500 mA current per the USB specification. However, some USB devices on the market exceed this limit, which can cause aberrant behavior or malfunction of the device.

If you encounter a functional problem with a USB device, check the device's current draw specification. Some devices can connect to an external power source rather than using the USB port for power. This requires the vehicle to be equipped with a suitable power hub.

Troubleshooting a Blank Display

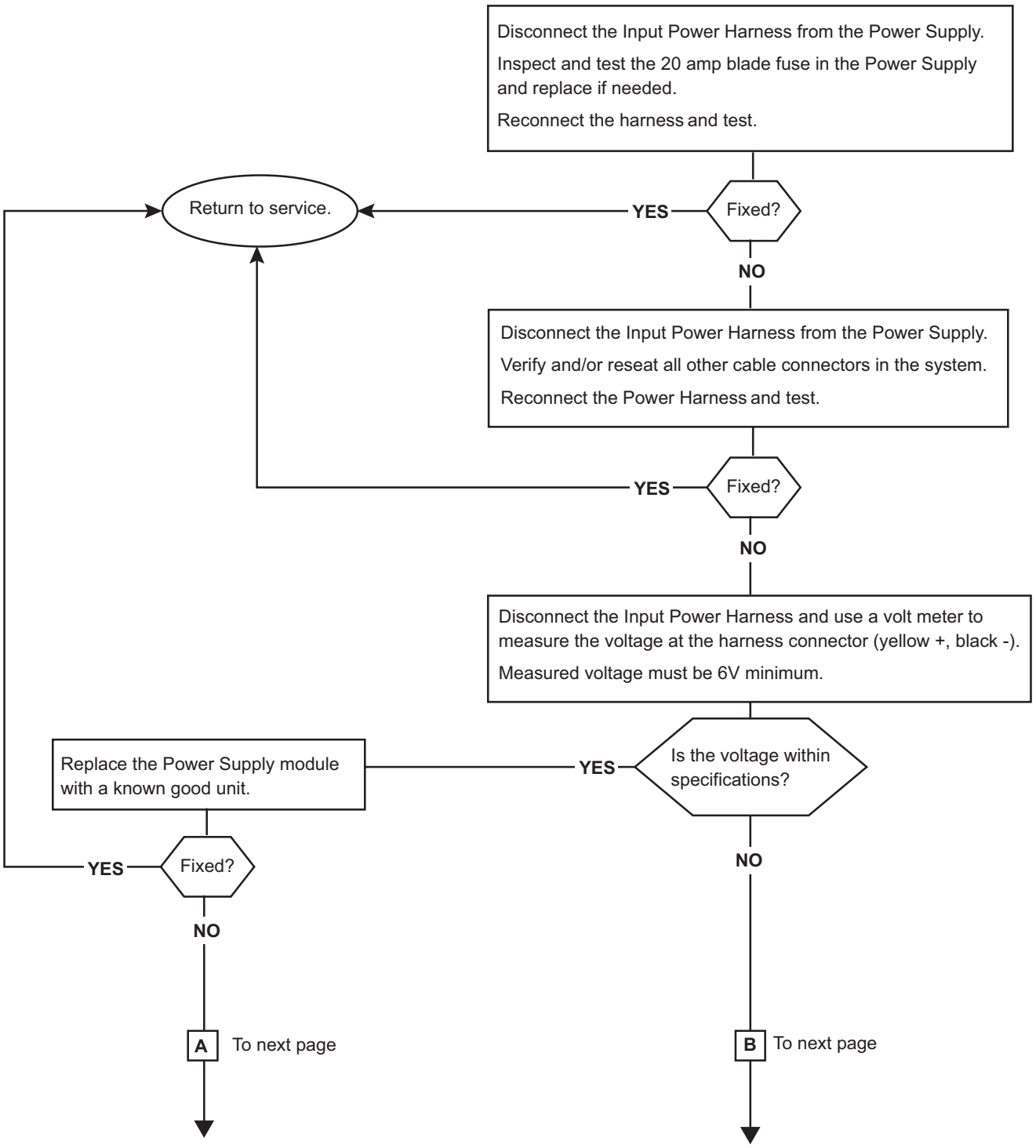
If you find the M5 II with a blank Display, it may be caused by the Display unit and its cabling, by a no-power condition in the system, or simply by the monitor blanking function of the operating system's power management.

The flow charts on the following three pages guide you through sequential checks, based on the system's LED indicators.

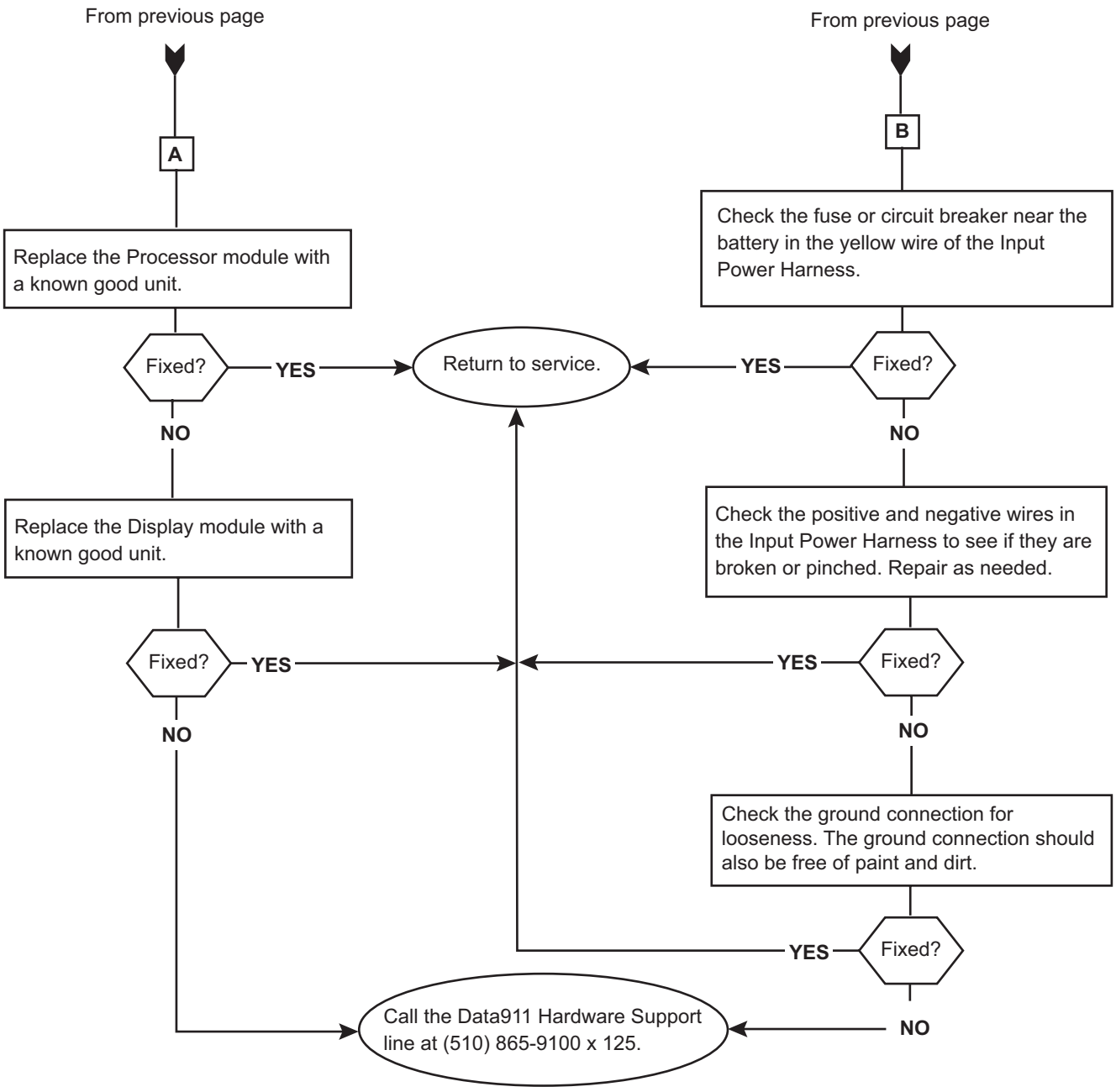

No Video Display
(8" Display)
Is the green LED on the Display illuminated?
YES
NO
Is the red LED on the Display illuminated?
YES
NO
Brightness controlled turned down.
or
Windows power monitor has turned off Display.
Fixed?
YES
NO
Return to service.
Display over-temperature condition.
Allow the unit to cool
Fixed?
YES
NO
Is the red LED on the Processor illuminated?
YES
NO
Check the cables between the Display and Processor.
Fixed?
YES
NO
Processor over-temperature condition.
Allow the unit to cool.
Fixed?
YES
NO
Return to service.
Call the Data911 Hardware Support line at (510) 865-9100 x 125.
Is the green LED on the Processor illuminated?
YES
NO
Windows is in hibernation mode. Press power button.
Fixed?
YES
NO
See the "No Power" chart.
No video signal due to:
1. Display malfunction, or
2. Display cable problems, or
3. Processor video output problem.
Replace each with known good unit to isolate problem.
Fixed?
YES
NO

No Power

Use this chart after the No Video Display chart.


Disconnect the Input Power Harness from the Power Supply.
Inspect and test the 20 amp blade fuse in the Power Supply and replace if needed.
Reconnect the harness and test.
Fixed?
YES
Return to service.
NO
Disconnect the Input Power Harness from the Power Supply.
Verify and/or reseat all other cable connectors in the system.
Reconnect the Power Harness and test.
Fixed?
YES
NO
Disconnect the Input Power Harness and use a volt meter to measure the voltage at the harness connector (yellow +, black -).
Measured voltage must be 6V minimum.
Is the voltage within specifications?
YES
Replace the Power Supply module with a known good unit.
Fixed?
YES
NO
NO
A
To next page
B
To next page

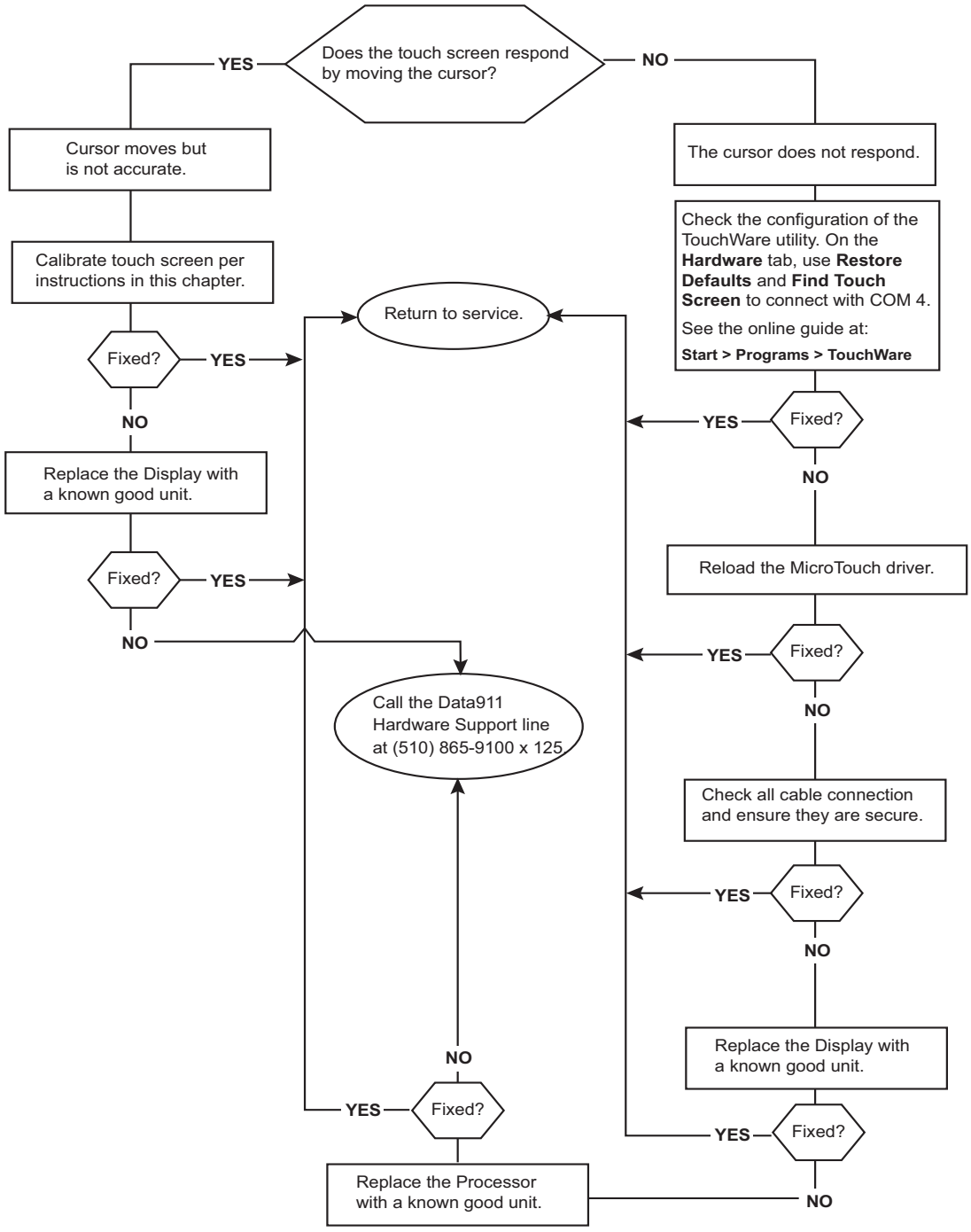
No Power (cont.)


From previous page
A
Replace the Processor module with a known good unit.
Fixed?
YES
Return to service.
NO
Replace the Display module with a known good unit.
Fixed?
YES
NO
Call the Data911 Hardware Support line at (510) 865-9100 x 125.
From previous page
B
Check the fuse or circuit breaker near the battery in the yellow wire of the Input Power Harness.
YES
Fixed?
NO
Check the positive and negative wires in the Input Power Harness to see if they are broken or pinched. Repair as needed.
YES
Fixed?
NO
Check the ground connection for looseness. The ground connection should also be free of paint and dirt.
YES
Fixed?
NO

Troubleshooting the Touch Screen

This flow chart guides you through the sequential checks to perform if you find the touch screen is not responding properly.

Touch Screen Problems



Technical Support

Data911 has a Hardware Service Department that offers technical support and operates a repair depot. Data911 also maintains a support web site were you can find various technical references, downloads, and optional equipment. If your equipment requires repair, this section provides instructions for returning the equipment to the repair depot.

Support Resources

Data911 offers technical support through its Hardware Service Department and its support web site.

▶ Hardware Service Department

The Data911 Hardware Service Department is available to our customers from 5 a.m. to 5 p.m. PST for technical questions or equipment service.

Before contacting the Hardware Service Department for support or repair, gather as much information about the problem to assist in a proper diagnosis. Support technicians require serial number, part number, and a detailed description of the problem to provide service.

Hardware Service Department contact information:

rma@data911.com

(510) 865-9100 x125

Fax: (510) 865-9006

▶ Support Web Site

The Data911 support web site is at:

www.data911.com/M5

You must contact the Hardware Service Department to obtain the login code to access this site.

At this site, the following support materials can be found:

- RMA request procedures and forms
- Drivers
- OS install instructions
- Technical bulletins
- Technical manuals and other instructions
- Mounting hardware

RMA Request Procedure

If you need to return your equipment to Data911 for servicing, follow these instructions to ensure proper handling:

1. Call or email the Data911 Hardware Service Department for an RMA (return material authorization) number.
2. Obtain an RMA Request Form and write your RMA number on it. *Fill out the RMA Request Form completely, providing as much detail as possible*. You can get an RMA Request Form by fax or email by contacting the Data911 Hardware Service Department, or you can download the form from the support web site.
3. Use our *original* shipping boxes to pack the returning equipment. If you need shipping materials, please call Data911 and we can provide the shipping materials to you.
4. Write the RMA number on the outside of the box.
5. Send the equipment *freight prepaid* to Data911:

   RMA Dept.
   Data911 Systems
   2021 Challenger Drive
   Alameda, CA 94501

APPENDIX A

Optional Equipment

In This Appendix

- Hard Drive Imaging, page 58
- Live Video, page 61
- USB Strain Relief, page 63
- Cable Protector Kit, page 64
- Global Positioning System, page 65

This Appendix contains instructions for installing and/or operating optional equipment offered by Data911 that requires additional instruction.

Data911 offers a variety of optional equipment, which can be viewed on our support web site (see below). Some of this equipment is OEM (original equipment manufacturer) items that Data911 provides to its customers. These items are packaged with all necessary hardware, software and instructions from the manufacturer. Accordingly, these items are not included in this Appendix.

See the Product Catalog on Data911's support web site for a list of all optional equipment:

www.data911.com/M5

Contact Data911 Hardware Support for the login password to access the support site:

(510) 865-9100 x125
rma@data911.com

Hard Drive Imaging

The hard drive imaging kit provides you with the capability to create and store an image of your hard drive, and to restore a hard drive from stored image.

The part number for this option is D9-09-0008.

Kit Contents

- FireWire drive (Macally™ PHR250CC enclosure with 40 GB hard drive, 60 GB optional)
- USB flash drive (Lexar™ JumpDrive, JDCL128-231)
- Norton Ghost™ application (single license retail version).
- Instruction document

Note that Norton Ghost is already installed on the FireWire drive so you can store the copy that comes in the kit.

Imaging Instructions

You will connect the FireWire drive and flash drive to the M5 II Processor before powering it on. The Processor will not boot to a FireWire device, but it will boot to a USB device. Accordingly, the FireWire drivers are on the flash drive and will load during bootup.

Perform the following steps to conduct an imaging task:

Step 1 Connect the FireWire drive to the FireWire port, and connect the USB flash drive to a USB port on the M5 II Processor.

Only the FireWire data cable is needed; no external power cable is required.

Note: Do not use the FireWire drive's USB port to connect to the M5 II. Doing so may prevent the system from booting to the flash drive, as is required for this operation.

Step 2 Power-on the M5 II.

If the Processor is properly booting from the flash drive, you will see the flash drive LED flicker and the Imaging Kit menu will appear on the Display when the boot sequence completes.

Step 3 *Skip this step if the Processor booted properly from the flash drive.*

If the Processor did not boot properly in Step 2, modify the BIOS as follows:

1. Restart the Processor and press **F2** immediately to enter Setup mode.
2. In the BIOS Setup Utility window, use the → arrow key to select the **Boot** menu.
   You should see USB HDD: Lexar listed under the heading, Excluded from the boot order.
3. Use the ↓ arrow key to select the USB HDD: Lexar entry.
4. Press the **X** key and observe the entry move to the Boot priority order section.
5. Press the + key to move the Lexar entry to the top of the priority list.
6. Press **F10** to save and exit the BIOS.
7. Restart the Processor.

Step 4 At the Imaging Kit menu screen, choose the appropriate menu command:

`Restore hard drive from custom image name`

This option overwrites all data on the hard drive with the contents of the custom image you specify. You must have created and stored the custom image on the FireWire drive prior to this time.

The hard drive does not need to be formatted prior to this operation since all existing data is overwritten with the image file.

`Backup hard drive to custom image name`

This option backups the hard drive contents to a custom image name and stores it on the FireWire drive. This option will not alter the hard drive contents. However, it will overwrite any existing image on the FireWire drive with the same name.

Any number of custom images can be stored on the FireWire drive, up to its capacity.

The image name must be no longer than 8 characters.

`View Ghost image files available on the FireWire drive`

This option displays all `.gho` extension files on the FireWire drive root.

`Exit to the DOS Prompt`

This option takes you to the DOS screen where you can use DOS commands to maintain or organize the FireWire drive.

This option loads the FireWire drivers and assigns it a drive letter, but it does not run any other operations.

Step 5 When you run a menu command, the Ghost program will prompt you for various input or a confirmation as required. There is no manual navigation necessary for running Ghost, except for Disk-Marking confirmation if Ghost encounters a new drive.

Step 6 When prompted for an image file name, you are provided with a directory listing of the files on the root of the FireWire drive.

Step 7 At end of the imaging process, you will see either a confirmation of successful imaging or an applicable error message that indicates failure type. If a failure is indicated, you can research Ghost error codes on the Symantec Web site (www.symantec.com).

Operation Notes

- The image file created from any given hardware platform is not necessarily compatible for use on a different hardware platform, and in most cases will not be compatible.
- Even when imaging between the same hardware platforms, the Windows XP operating system may need to be reactivated if a different hard drive or memory size is detected.
- Consider the use of Sysprep, Ghost Walker, or NewSID prior to creating a Ghost image in order to remove machine-specific settings. For more information visit the Microsoft or Symantec online knowledge bases.
- The Ghost package is a single license version that is intended for use on one computer only. It is your responsibility to purchase the appropriate quantity of licenses for your agency.
- DO NOT delete the `Save.tag` file on the FireWire drive, as it is used for drive letter identification. The `Prod_ok.gho` file may be deleted.

Live Video

The M5 II can be ordered with the Live Video option that provides the ability to plug a video camera into the M5 II Processor and view the video on the M5 II Display. You can also freeze an image display and save it as a graphic file.

An M5 II ordered with Live Video has a video card installed in the Processor and a video connector on the Processor front panel.

Live Video is normally ordered when the M5 II is purchased. If it is being added to an existing system, the Processor must be returned to Data911 for the installation.

Note:	Live Video cannot be installed on an M5 II that also has the GPS option since they both use the same card slot in the Processor.

If the video driver or the Live Video application needs to be reinstalled, navigate to D:\Camera Viewer and follow the instructions in the Readme.doc file.

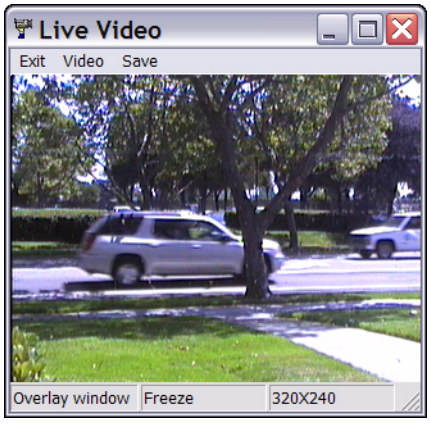
The part number for this option is BA-01-2009-U.

Operation

Live Video is a relatively simple video viewing device that has only a few controls and settings.

Connect the video camera to the Video In connector on the M5 II Processor. This is an RCA connector.

Double click the **Camera Viewer** icon on the desktop, or select **Camera Viewer** from the Programs menu, to open the Live Video window.



The video stream from the camera will immediately display in the window.

On the command bar:

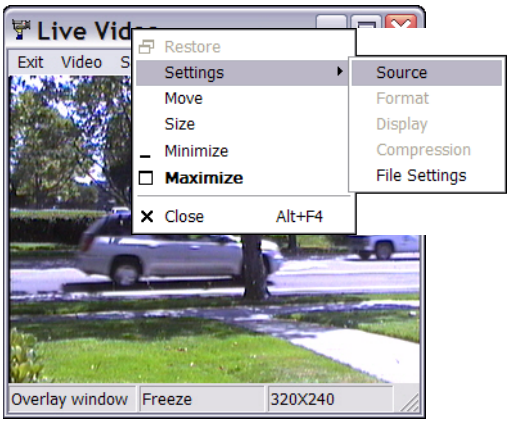
Use the **Freeze / Video** button to freeze the image or to resume video feed.

Use the **Save** button to capture the displayed image as a graphic file. You can also freeze the image then save it.

Use the **Exit** button to close the viewer.

Settings

There are a few application settings in Live Video that you may wish to define.



Right-click on the Live Video title bar and select **Settings** from the pop-up menu. In the resulting sub-menu, only **Source** and **File Settings** are active.

The **Source** commands opens the Video Source dialog box. In the dialog, the Device Settings tab has image quality controls that you can set. The other tabs require a more complex interface to be active controls.

The **File Settings** command opens the File defaults dialog box. This dialog sets the default folder where saved images are stored. As installed, the default location is the desktop. Use this dialog to select a different folder. Note that the **Save** button does not give you a navigation window where you can select a folder. **Save** captures the image and stores it only to the default location.

The other commands on the sub-menu are not active.

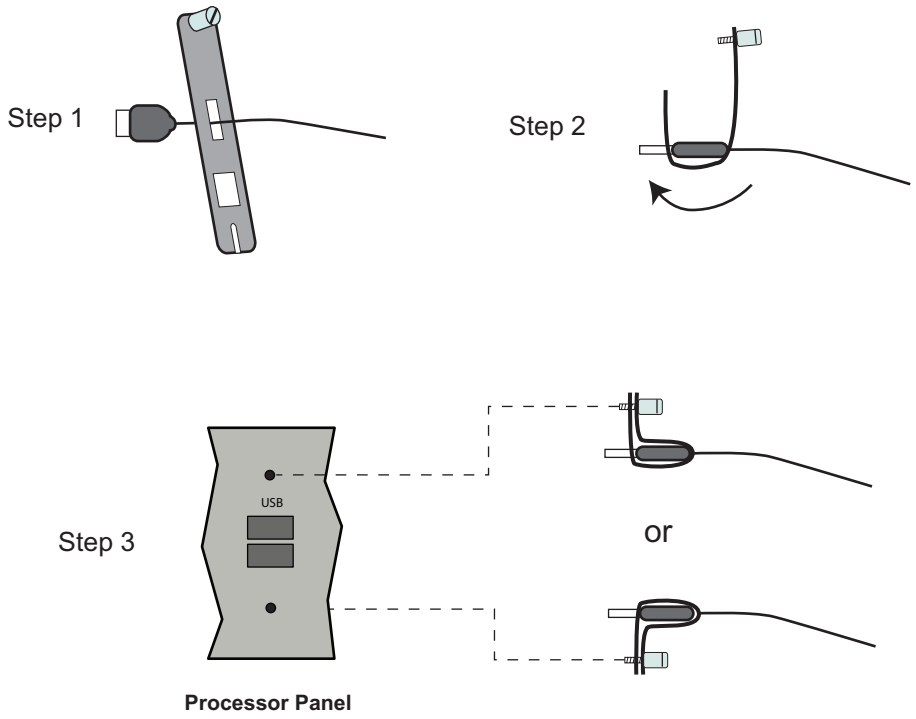
USB Strain Relief

A strain relief for USB connectors can be ordered from Data911. The strain relief is designed for use with the USB connectors on the front and back panels of the Processor.

The part number for this option is D9-09-0007.

This strain relief is recommended for all vehicle installations. Install the relief as shown in Figure 8.

Figure 8 USB Strain Relief Installation



Cable Protector Kit

A cable protector is available for the front panel of the Processor. This protects the cables from physical damage when the Processor is installed on a vehicle in a location where it could be hit by items being stored in the same compartment.

The cable protector applies to the front panel only.

The part number for this option is D9-08-2010.

Install the cable protector as shown in Figure 9 and described in the following instructions:

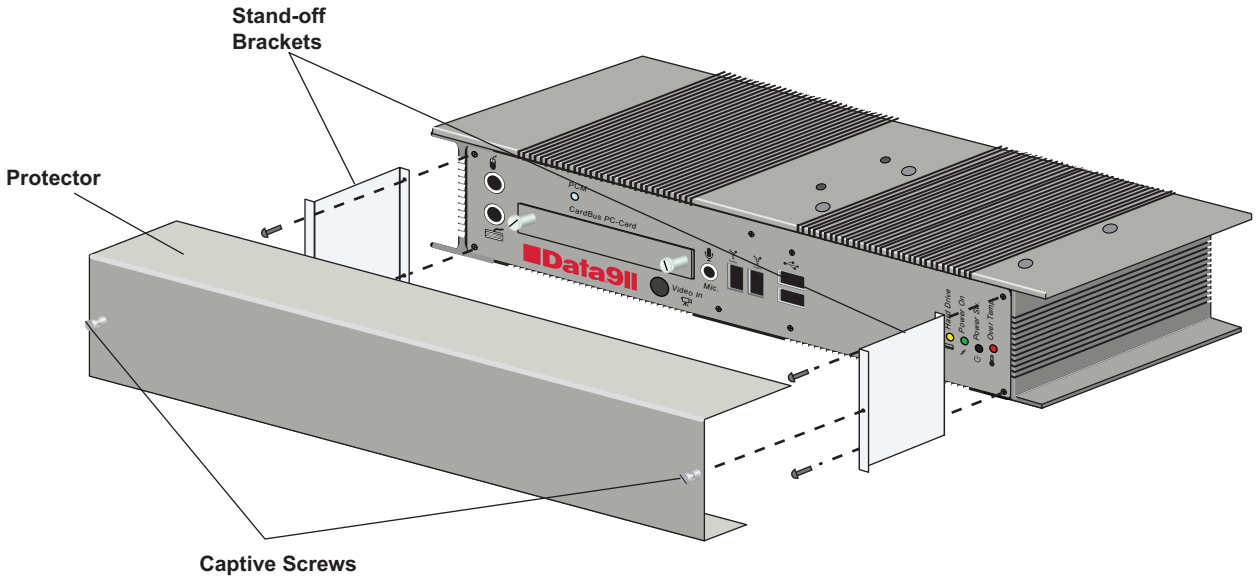
Step 1 Remove and discard the four corner screws from the front panel of the Processor.

Step 2 Install the two stand-off brackets onto the front panel using the four 4-40 x 3/8” screws supplied with the protector.

Step 3 Attach all cables to front panel.

Step 4 Install the protector onto the stand-off brackets using the two captive screws.

Figure 9 Cable Protector Kit



Global Positioning System

This section provides a brief technical description of the GPS module integration into the M5 II Processor, then explains the process for changing the configuration for different output protocols.

The part number for this option is BA-01-2019-U.

Introduction

Data911 offers a Trimble® Lassen® iQ GPS (Global Positioning System) receiver as optional equipment integrated into the M5 II Mobile Computer System. The GPS receiver provides position, time and velocity data to other application installed on the M5 II.

The GPS receiver is on a mezzanine card attached to the M5 II Processor motherboard. An SMA antenna connector is on the back panel of the Processor. The GPS antenna housing is available with magnetic or mechanical mounting.

The following product description is taken from the *Lassen iQ GPS Receiver, System Designer Reference Manual*, Part Number 54854-00, Revision B, April 2005:

> The Lassen iQ GPS receiver is a full featured, ultra low power receiver on a miniature form factor, suitable for a variety of mobile, embedded applications. The Lassen iQ GPS receiver incorporates Trimble's FirstGPSTM architecture in the form of two ASICS: Colossus RF down converter and IO-C33 baseband chip.
>
> The Lassen iQ GPS receiver outputs a complete position, velocity, and time (PVT) solution in the NMEA Version 3.0 ASCII protocol, the Trimble ASCII Interface Protocol (TAIP), and the Trimble TSIP binary protocol. A Pulse-Per-Second signal is available for very accurate timing applications.

▶ Acquiring a Satellite Signal

The GPS receiver needs input from four satellites for full functionality. The first search for satellites by a GPS receiver with a new configuration may take up to 15 minutes to acquire all four. *Do not disrupt the search process.* The receiver attempts to calculate position within two minutes, but complete acquisition takes more time.

The receiver compiles an almanac of satellite positions. After the almanac is built, acquisition time is less than a minute when the receiver is powered on.

▶ Utilities

Data911 includes two Trimble utility programs on Drive D of the M5 II Processor:

- Configurator.exe – Use this program to load one of the Data911 configuration files, and to read configuration settings.
- Monitor.exe - Use this program to monitor general health; to display position, velocity, timing and other data; and to reset the receiver to the factory default configuration.

Additionally, in the same directory, Data911 provides a terminal utility:

- term131.exe – Use this program to verify the output of the GPS receiver when in NMCA or TAIP modes. May also be used to send commands to the GPS receiver.

You will see references to “Port 1” and “Port 2” in the Configurator utility. These port references just indicate the lower numbered and higher numbered COM ports in the host computer. In the Data911 default configuration, Port 1 is COM 7 and Port 2 is COM 8.

▶ Ports

The GPS receiver uses two serial ports for software communications with GPS-dependent applications installed on the M5 II. The M5 II is configured at the factory for the GPS receiver to use ports COM 7 and COM 8. The Configurator and Monitor utilities (described above) communicate over COM 7 with TSIP protocol; any GPS-dependent applications installed on the M5 II (including the terminal utility) communicate on COM 8 with either NMEA or TAIP protocols.

You must specify COM 8 as the GPS communication port, and specify either NMEA or TAIP protocols, in any application you install on the M5 II that requires a GPS signal.

▶ Protocols and Configuration Files

As installed on the M5 II, the GPS receiver can be configured to communicate through these software protocols:

- TSIP (Trimble Standard Interface Protocol)
- TAIP (Trimble ASCII Interface Protocol)
- NMEA (National Marine Electronics Association)
- RTCM SC-104 (GPS industry standard for differential correction data)

Applications designed to work with a GPS signal will specify which protocol they need for communication. The M5 II provides NMEA and TAIP interface protocols for this purpose. TSIP is reserved for controlling the receiver. Data911 customers normally specify on the sales order which protocol they need so that the M5 II is delivered with the GPS configured for immediate use.

Caution: Using any other configuration method than that described here may cause unpredictable GPS behavior. Only the most experienced technicians should attempt to manually configure the GPS.

There may be circumstances that require you to change from one protocol to the other. Manually reconfiguring the GPS receiver to use a different protocol is technically complex and requires familiarity with Trimble products. To make the task easier, and to ensure the GPS receiver functions in the M5 II, Data911 provides two configuration files for your use—one outputs NMEA and the other outputs TAIP on COM 8 for communication with GPS-dependent applications. Both of these configuration files use TSIP in/out on COM 7 for communication with the Trimble utilities. Loading a configuration file is described in the next major section.

The following configuration files are supplied with the M5 II:

- Data911 configuration file IQ2-NMEA.dat

  COM 7– TSIP in/out

  Port configuration – 9600 baud, 8, odd, 1

  COM 8 – RTCM in / NMEA out

  Port configuration – 4800 baud, 8, none, 1

- Data911 configuration file IQ2-TAIP.dat

  COM 7 – TSIP in/out

  Port configuration – 9600 baud, 8, odd, 1

  COM 8 – TAIP in/out

  Port configuration – 9600 baud, 8, odd, 1

The ports are configured automatically by the configuration files.

Note: You cannot modify these pre-configured files. If you need a custom configuration file, contact Data911 Hardware Support Department at (510) 865-9100 x125

Additionally, Trimble's default configuration is stored in memory and can be retrieved as discussed in the section, Loading Trimble Default Configuration File, on page 71. This configuration outputs minimal data messages so its usefulness is limited. The interface specifications are:

COM 7 – TSIP in/out

Port configuration – 9600 baud, 8, odd, 1

COM 8 – RTCM in / NMEA out

Port configuration – 4800 baud, 8, none, 1

▶ Memory

The Trimble default configuration file is permanently stored in flash memory on the Trimble GPS module. This allows you to easily retrieve the factory settings if you need to return the GPS receiver to a known state. The procedure for this is in the section, Loading Trimble Default Configuration File, on page 71.

When you load one of the Data911 configuration files, it is stored in RAM on the GPS mezzanine card. This is a BBRAM (battery backed up RAM) so the memory is non-volatile. The GPS operates from the configuration file in RAM. Do not over-write the flash memory (EEPROM) with the contents of the RAM. Loading a configuration file is described in the next section.

Configuring the GPS Receiver

As explained in the introduction, the M5 II is delivered with the appropriate configuration file loaded into the GPS receiver, if that information was provided when the system was ordered. The two supplied configuration files will output either NMEA or TAIP protocols. You load the appropriate file to change the GPS output protocol.

Caution: During any of these configuration processes, if you see a dialog box that allows you to write to the EPROM, be sure to respond with NO. This would overwrite the flash memory where the factory default configuration file is stored.

▶ Loading Data911 Configuration File

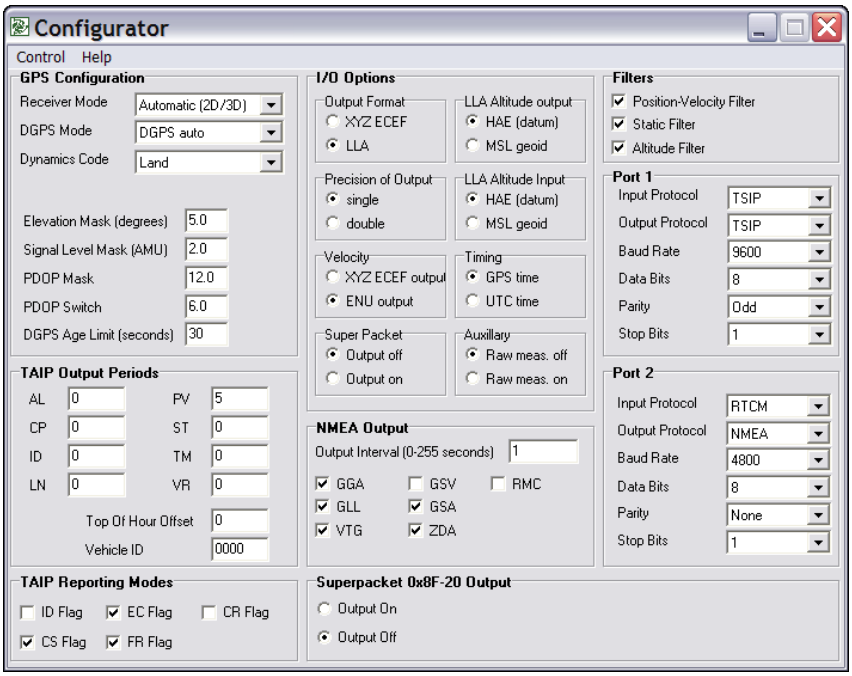
Use this procedure to load one of the Data911 configuration files into the GPS module. The Monitor utility must not be running or it will prevent the Configurator from connecting with port COM 7. Close any application that uses GPS data.

Step 1 Open the Configurator utility by executing the file at this path:

```
D:\PCI UART_GPS\Programs\IQ_Configurator.exe
```

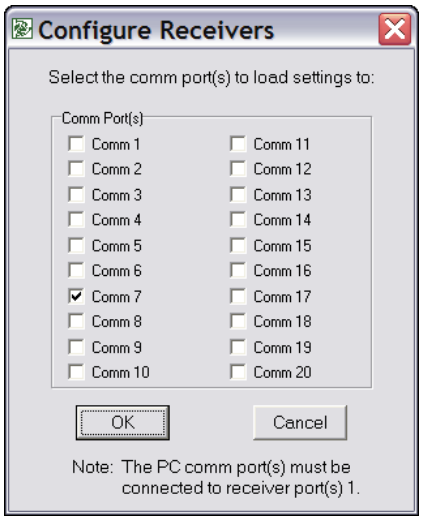
1. In the Config... dialog, choose **Lassen iQ**.
2. In the File load dialog, navigate to `D:\PCI UART_GPS\Programs\` and **Open** either the `IQ-NMEA.dat` or `IQ-TAIP.dat` file.

The Configurator utility opens and is populated with the data from the selected configuration files. The Output Protocol displayed in the Port 2 panel confirms which configuration file was loaded.

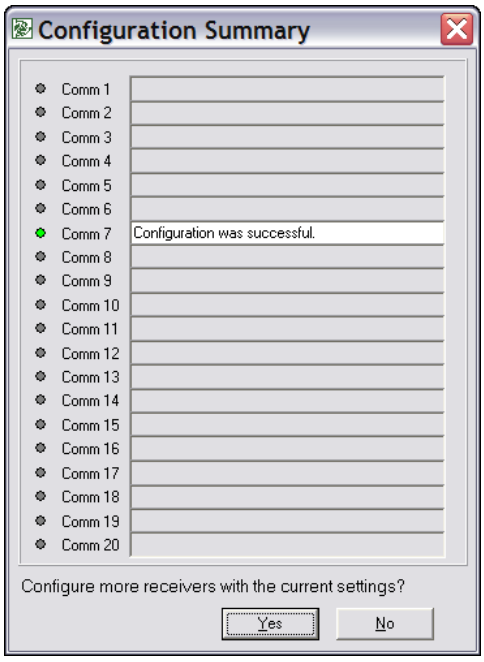


Step 2 Send the configuration data to the GPS module.

1. Pull down the Control menu and select **Configure Receiver(s)**. The Configure Receivers dialog opens.
2. Select the **COM 7** check box and click **OK**.


Configure Receivers
Select the comm port(s) to load settings to:
Comm Port(s)
Comm 1 Comm 11
Comm 2 Comm 12
Comm 3 Comm 13
Comm 4 Comm 14
Comm 5 Comm 15
Comm 6 Comm 16
Comm 7 Comm 17
Comm 8 Comm 18
Comm 9 Comm 19
Comm 10 Comm 20
OK
Cancel
Note: The PC comm port(s) must be connected to receiver port(s) 1.

3. The Configuration Summary window confirms the successful configuration of the receiver. Click **No** to close the window.



Step 3 Close the Configurator dialog.

The GPS receiver is now configured. This configuration will persist through resets and power cycling of the M5 II.

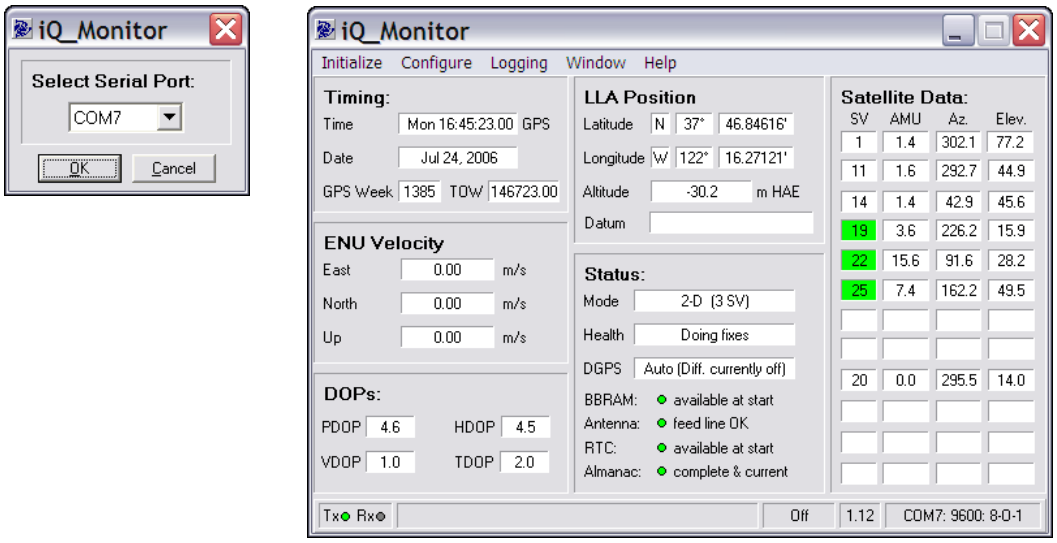
▶ Loading Trimble Default Configuration File

If you encounter configuration problems, an inability to communicate with the GPS receiver, or a problem with the receiver communicating with applications, your first actions should be to verify which protocol is needed and to re-load the appropriate configuration file. If suspected configuration problems persist, you can load the Trimble default configuration file, which is stored permanently in flash memory. This returns the receiver to a known state from which you can then load a Data911 configuration file.

Step 1 Open the Monitor utility by executing the file at this path:

```
D:\PCI UART_GPS\Programs\IQ_Monitor.exe
```

In the iQ_Monitor port dialog, choose COM7 and click **OK**. The Monitor window opens.



Step 2 Pull down the Initialize menu and choose **Factory Reset**.

After you confirm your choice the GPS receiver will be configured with the Trimble default settings.

Data911 does not recommend using this configuration in operation due to its limited NMEA messaging capabilities.

▶ Determining the Configuration

There may arise circumstances when you need to determine which protocol is loaded in the GPS receiver. While there is no window that will explicitly state which configuration is loaded, you can determine the loaded configuration by viewing the receiver output with the terminal utility.

You set the terminal to communicate on port COM 8, and set the port parameters for either NMEA or TAIP (see the discussion about protocols on page 66). If the terminal displays intelligible data, then you have identified the protocol. If it displays foreign characters, reset the terminal with the port parameters for the other protocol and observe the display again.

Step 1 Open the Terminal utility by executing the file at this path:

```
D:\PCI UART_GPS\Programs\term131.exe
```

Step 2 In the Settings panel, set the Port No. to **COM 8** and set the remaining parameters to match those of the protocol for which you want to test:

NMEA – 4800, none, 8, 1

TAIP – 9600, odd, 8, 1

Step 3 Click the **Init Port** button at the bottom of the window and observe the display in the left panel.

If the port parameters match those of the configuration file, intelligible data is displayed in the left panel, as shown in Figure 10.

If it does not match, foreign characters are displayed. In this case, close and reopen the terminal. Set the Baud rate and Parity parameters for the other protocol and click **Init Port** again.

Notice that the NMEA protocol is used for both the Trimble default configuration and for a Data911 configuration. However, these two version of NMEA do not output the same data. By examining the output in the Terminal window you can distinguish between the two configuration files.

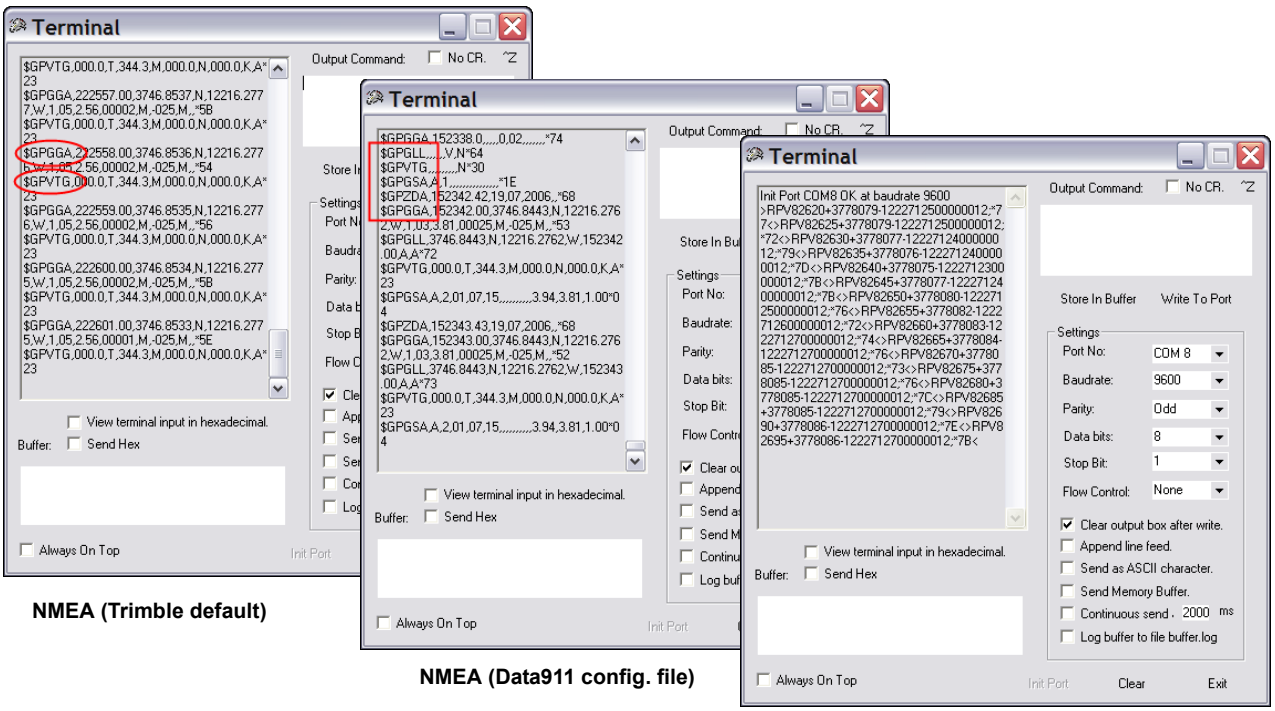
The Terminal displays the ASCII version of the various message types that the GPS produces. The type of message is identified by a 3-letter code preceded by $GP. For example, a GGA message type appears as $GPGGA. The difference between the Trimble and Data911 configurations is the number of message types each uses, and this is how you can distinguish between the two. The Trimble configuration uses two message types while Data911 uses five message types, as shown in Table 9 below.

Figure 10 below shows how the different message types appear in the Terminal window. In addition to the two versions of NMEA output, the TAIP protocol outputs only an RPV (position / velocity) message type.

Table 9 GPS Message Types

Message Type	Message Content	Config. File Application
GGA	GPS fix data	Data911 & Trimble
GLL	Geographic position - Latitude/Longitude	Data911
GSA	GPS DOP and active satellites	Data911
VTG	Track made good and ground speed	Data911 & Trimble
ZDA	Time & Date	Data911

Figure 10 GPS Message Type Display



NMEA (Trimble default)

NMEA (Data911 config. file)

TAIP (Data911 config. file)

APPENDIX B

Specifications and Warranty

In This Appendix

- Technical Specifications, page 76
- Limited Warranty, page 79

This appendix provides technical specifications for the components of the M5 II Mobile Computer System. The Data911 limited warranty provisions are also included here.

Technical Specifications

System cables are described in Table 1 on page 22.

See Data911's support web site for optional equipment and accessories. Contact information is on page 7.

Processor

Table 10 Processor Electrical and Mechanical Specifications

Component	Basic Configuration	Options
CPU	Intel® Celeron® M 1.5 GHz	Intel® Pentium® M 1.8 GHz
RAM	512 MB DDR-SO-DIMM	1024 MB
Operating System	Windows® XP Professional	– –
Hard Drive (with heaters)	40 GB	60 GB 80 GB
Dimensions	6.4 x 14.6 x 31.8 cm (2.5 x 5.75 x 12.5 in.)	
Weight	2.3 kg (5 lbs)	
Construction	Extruded aluminum case	

Table 11 Processor Environmental Specifications

Environment	Operating	Non-Operating
Shock	100g	175g
Vibration (P-P)	1g	1g
Temperature	-25°C to +65.5°C (-13°F to +150°F)	-30°C to +85°C (-22°F to +185°F)
Relative humidity	5% to 95% non-condensing	5% to 95% non-condensing

Power Supply

Table 12 Power Supply Electrical and Mechanical Specifications

Component	Basic Configuration
Input Voltage / Current	6 - 18 VDC 2.9 A @ 13.8 VDC (Nominal)
Output Current/Voltage	10A @ 5 VDC 4A @ 12 VDC
Dimensions	6.4 x 14.6 x 16.5 cm (2.5 x 5.75 x 6.5 in.)
Weight	1.6 kg (3.5lbs)
Construction	Extruded aluminum case

Table 13 Power Supply Environmental Specifications

Environment	Operating	Non-Operating
Shock	100g	175g
Vibration (P-P)	1g	1g
Temperature	-40°C to +85°C (-40°F to +185°F)	-55°C to +100°C (-67°F to +212°F)
Relative Humidity	5% to 95% non-condensing	5% to 95% non-condensing

Display (8 inch)

Table 14 Display Electrical and Mechanical Specifications

Component	Basic Configuration
Display type	Active Matrix Color
Resolution	800 x 600 SVGA
Luminescence	1200+ Nit
Display viewing area	21.3 cm (8.4 in.) Diagonal
Viewing angle	+/- 60°
Touch panel	Resistive touch screen
Construction	Heavy-gauge aluminum case
Dimensions	21.0 x 18.6 x 6.0 cm (8.25 x 7.3125 x 2.375 in.)
Weight	1.4 kg (3 lbs)

Table 15 Display Environmental Specifications

Environmental:	Operating	Non-operating
Shock	100g	175g
Vibration	1g	1g
Temperature	-25°C to 65.5°C (-13°F to 150°F)	-30°C to 85°C (-22°F to 185°F)
Relative humidity	5% to 95% non-condensing	5% to 95% non-condensing

Limited Warranty

Data 911 warrants this product against defects in material or workmanship for one year, to the original buyer (and is not assignable or transferable to any other party) subject to the following conditions:

1. LABOR: If, within thirteen months from the original date of shipment this product is determined by Data911 to be defective, Data911 will repair or replace the product, at its option, for no charge on labor. After this warranty period, the customer is responsible for all labor charges.
2. PARTS: Data911 will supply, at no charge, new or refurbished parts when the product is received (using the proper RMA procedures), evaluated, and deemed defective by Data 911, for a period of thirteen months from the original date of shipment. All of the replaced parts shall become property of Data911. Repaired or replacement parts are warranted for the balance of the original applicable warranty period. Replacement parts are available from Data911; please call the number below for price and availability.
3. ACCESSORIES: The above conditions apply to all accessories manufactured by Data911.

This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, negligence, or modification to any part of the product. This warranty does not cover damage due to improper operation, installation, maintenance, connection to improper voltage supply, or attempted repair by anyone other than a facility authorized by Data911 to service this product. This warranty does not cover consumables such as fuses or batteries.

This warranty is invalid if the factory-applied serial number has been altered or removed from the product. This warranty is invalid if any one other than Data911, or an authorized repair facility, opens this product for any reason.

Extended warranty service is available. Please request a quotation by calling the number listed below or your regional sales office.

To obtain warranty service, first phone Data911 at (510) 865-9100 x 125 to obtain an RMA number and proper RMA documentation. Then return the product to Data911 freight prepaid in its original packaging or packaging affording an equal degree of protection (Data911 will supply packaging if necessary, please inquire). Be sure the RMA number is clearly indicated on the package.

Ship all Return Materials to:

Data911
Attn: RMA # *******
2021 Challenger Drive
Alameda, CA 94501
(510) 865-9100 x 125

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